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GEOTECHNICAL, GEODACOUSTICAL, AND SEDIMENTOLOGICAL PROPERTIES OF--ETC(U)
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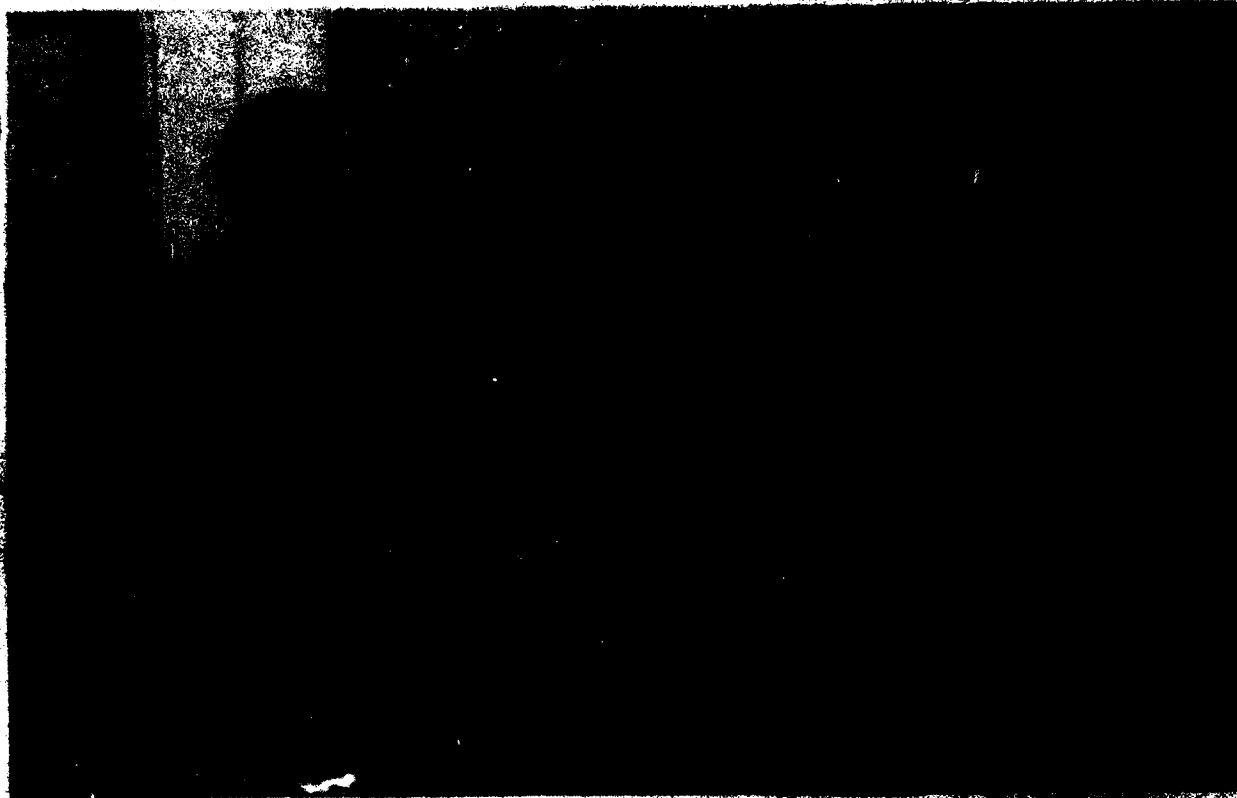
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Naval Ocean Research and
Development Activity
NSTL Station, Mississippi 39529



Geotechnical, Geomorphological, and Sedimentological Parameters
of Thirteen Bottom Sediment Cores Collected in the
Shallow Water Approaches to Norfolk, Virginia



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Sponsor
NAVAIR-548, P.E. 62260N

Task Manager
Naval Coastal Systems Center - 722

Prepared for:
NORDA Code 115 Environmental
Requirements and Program Analysis Group

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Naval Oceanographic Station

June 1982

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ABSTRACT

Thirteen sea bottom cores were collected by scuba divers in the shallow water approaches to Norfolk, Virginia, and were analyzed for geotechnical, geoacoustical and sedimentological properties. These cores were collected in support of the Naval Ocean Research and Development Activity's Mine Attitude and Verification Task, sponsored by NAVAIR-548 and tasked by the Naval Coastal Systems Center (NCSC Code 722). Similar field efforts have been conducted in the San Diego, California, and Galveston, Texas, areas, and the analyses on the resulting bottom cores are underway. The results of these core analyses will be used with historical data in the Naval Oceanographic Office's world-wide data bank to investigate the possible existence of reliable geotechnical property relationships for the East, West, and Gulf Coasts of the United States.

The Norfolk core analyses presented herein are for the use of interested readers who may have need for geotechnical, geoacoustical, or sedimentological data within this complex, strategically important area.



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GEOTECHNICAL, GEOACOUSTICAL, AND SEDIMENTOLOGICAL PROPERTIES
OF THIRTEEN BOTTOM SEDIMENT CORES COLLECTED IN THE
SHALLOW WATER APPROACHES TO NORFOLK, VIRGINIA

INTRODUCTION

This suite of cores was collected in the shallow water approaches to Norfolk, Virginia (Fig. 1), by scientific divers from the U.S. Naval Oceanographic Office (NAVOCEANO) and the Naval Coastal Systems Center (NCSC), supported by U.S. Navy and U.S. Coast Guard divers.

In order to conduct the analyses on cores with minimum disturbance due to shipping, all samples were analyzed in the field at a temporary laboratory. Analyses were conducted for the determination of sea floor acoustic properties (compressional sound speed), sediment shear strength (rotational vane shear), wet bulk density (volumetric) in those intervals for which shear strength was measured, and moisture (percent water content) during intervals between shear strength measurements. The latter values were subsequently used to back-calculate wet bulk density after laboratory determination of grain specific gravity.

Size analyses (percent composition by weight comprising one-Phi class intervals) were performed on the samples after the field operation, using sieve methods for the 62-micron and larger grains, and particle settling methods based on hydraulic equivalent size, assuming a specific gravity of 2.67 for silt and clay-sized material.

Sound velocity has been computed for each core, applying in situ correction factors for the minimum, mid, and maximum values of temperature and salinity measured in the bottom water in the survey area at various times during the field operation.

Several numbering systems have been used in the collection and analysis of the resulting cores. The table below provides a cross reference for use with the location chart presented in Figure 1.

Table 1. Bottom Core Identification Number Cross Reference

<u>ASSIGNED FIELD NO.</u>	<u>ASSIGNED LAB NO.</u>	<u>SURVEY SITE LOCATION</u>
M6	1	A1
D4	2	A2
D3	3	A2
D1	4	A2
D2	5	A3
D6	6	A3
D5	7	A3
B1	8	B1
B2	9	B1
C1-2	10	C1
C1-3	11	C1
H1	12	A2
S1	13	S

Table 2. Symbols used in Core Visual Description Sheets

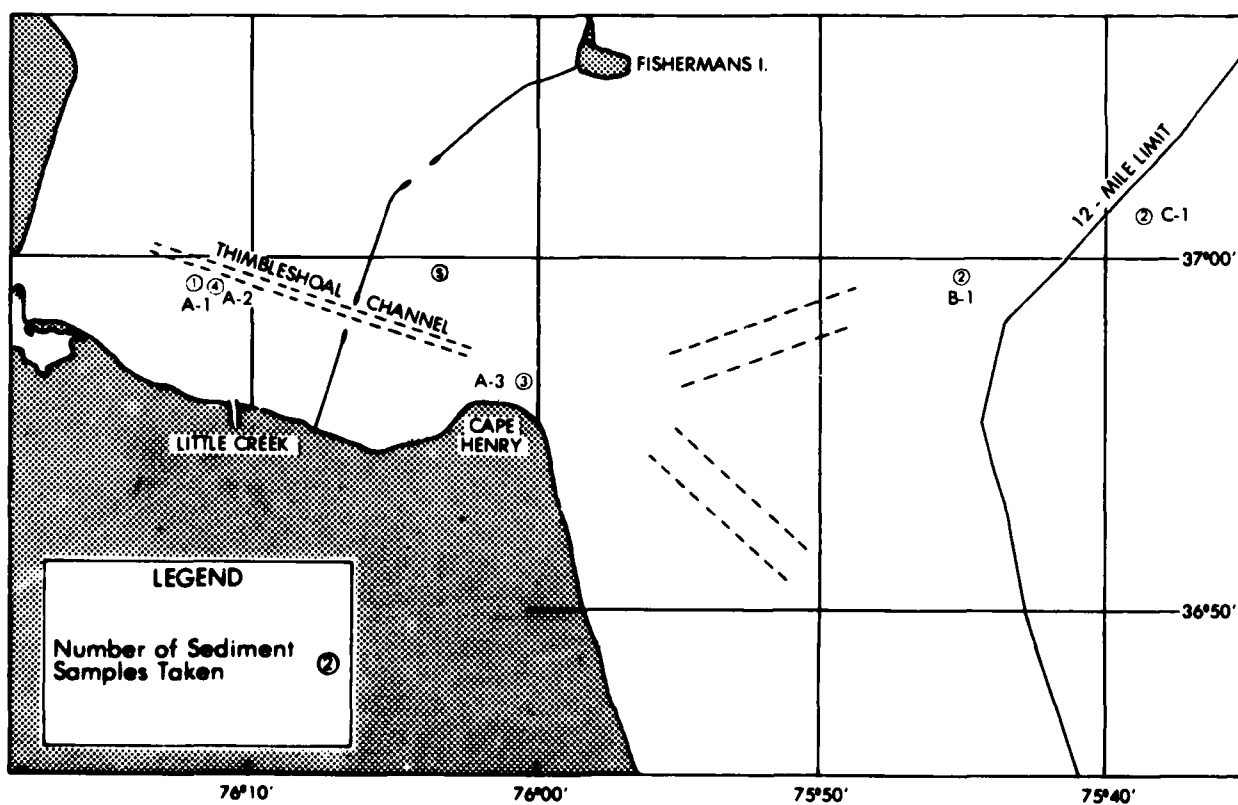
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Figure 1. Bottom core locations

EXPLANATION OF DATA PAGES
BOTTOM SEDIMENT ANALYSIS SUMMARY

ENGINEERING AND MASS PHYSICAL PROPERTIES

Results of engineering properties core analysis performed by the U.S. Naval Oceanographic Office Geological Laboratory are recorded on BOTTOM SEDIMENT ANALYSIS SUMMARY - ENGINEERING AND MASS PHYSICAL PROPERTIES.

The following is a description of the terms employed on the ENGINEERING AND MASS PHYSICAL PROPERTIES SHEET.

1. CRUISE NUMBER: A number assigned to each cruise for identification purposes.
2. LATITUDE: Expressed in degrees, minutes, and seconds.
3. LONGITUDE: Expressed in degrees, minutes, and seconds.
4. CORE NUMBER: A consecutive number, commencing with 1, applied to each core taken successively throughout the cruise.
5. DATE TAKEN: Day (GMT), month, and year.
6. WATER DEPTH (M): The uncorrected sonic sounding recorded in meters.
7. CORER TYPE: Diver-operated corer (DOC).
8. CORE LENGTH (CM): Recorded in centimeters as observed in the laboratory.
9. SAMPLE/DEPTH INTERVALS (CM): Interval of subsample, as measured in centimeters, from the top of the core.
10. WET UNIT WEIGHT (GM/CU.CM.): The weight (solids plus water) per unit volume of the sediment mass.
11. SPECIFIC GRAVITY OF SOLIDS: The ratio of weight, in air, of a given volume of sediment, at 20 degrees centigrade, to the weight in air of an equal volume of distilled water at 20 degrees centigrade.
12. WATER CONTENT (% DRY WEIGHT): The ratio, in percent, of the weight of water, in a given mass of the sediment, to the weight of the solid particles in the sediment sample.
13. VOID RATIO: The ratio of the volume of void spaces to the volume of solid particles in the sediment sample as computed from Wet Unit Weight, Specific Gravity of Solids, and Water Content.
14. SATURATED VOID RATIO: The Void Ratio, at 100 percent saturation, as computed from Water Content and Specific Gravity of Solids.
15. POROSITY(%): The ratio, usually expressed as a percentage, of the Volume of Voids, of a sediment mass, to the total volume of the sediment mass.

16. COHESION: Shear Strength, in a sediment, not related to interparticle friction. The sediment is sheared in a saturated, undrained state. Therefore: The Angle of Internal Friction is essentially equal to zero, and the Shear Strength is equal to the Cohesion of the sediment.

17. SENSITIVITY: The ratio of the natural to the remolded strength. It is a measure of the loss of strength due to remolding the sediment mass.

18. ULTIMATE BEARING CAPACITY: The ultimate stress, applied by an object of a certain shape, that a soil can support, i.e., the stress that causes a sudden settlement of the object.

EXPLANATION OF SEDIMENT SIZE AND COMPOSITION DATA

FIELD IDENTIFICATION AND ENVIRONMENTAL CONDITIONS TERMINOLOGY

SAMPLE NUMBER: A consecutive number applied to each core taken throughout the cruise.

CRUISE: A unique identification number assigned to the cruise.

TAKEN: The day, month, and year, which indicates when the core was taken.

DEPTH: The uncorrected sonic sounding expressed in meters.

LATITUDE: The north, or south, angular distance from the earth's equator, expressed in degrees, minutes, and seconds.

LONGITUDE: The east, or west, angular distance from the prime meridian, expressed in degrees, minutes, and seconds, at which the core was taken.

LENGTH: Laboratory observed length of the core recorded in Centimeters.

PENETRATION: Field observed penetration of the coring device expressed in Centimeters.

SEDIMENT SIZE STATISTICS AND COMPOSITION DATA

DIAM (PHI): A logarithmic transformation of the Wentworth grade scale in which the negative logarithm, to the base 2, of the particle diameter (in millimeters) is substituted for the diameter value.

DIAM (MM): Particle diameter, in millimeters, of size intervals based on the Wentworth grade scale.

PERCENT: Percent of total sample weight within the given size interval.

DATA ANALYZED: Month, and year, when all required analyses, for a given core, were completed

GRAVEL, SAND, SILT, and CLAY. Percent of the total sample weight within the four size classes. Class ranges are:

- Gravel-Particles coarser than 2 mm
- Sand-Particles within the range 2 mm to 0.0625 mm
- Silt-Particles within the range of 0.0625 to 0.0039 mm
- Clay-Particles finer than 0.0039 mm

MEAN (MM): The geometric mean of the distribution expressed in millimeters.

MEAN (PHI): The logarithmic mean of the distribution expressed in phi units.

COLOR: A mass property of a sediment represented by the overall hue caused by a combination of the color of the particles, surface coating matrix, and cement, and controlled, in part, by the degree of fineness of the particles. The numerical designation of the color represents the best match of the sediment with the color chips found in the GSA Rock Color Chart.

STANDARD DEVIATION: A measure of the degree of spread, or dispersion, of the particle size distribution, about the mean. It is expressed in phi units, and is calculated from the relation:

$$s = \sqrt{\frac{\sum f (X_i - \bar{X})^2}{100}}$$

SKEWNESS: A measure of the asymmetry, of the distribution, which is calculated from the relation:

$$\text{Skewness} = \frac{\sum f (X_i - \bar{X})^3}{2 * 100s^3}$$

Positive values denote a skewness of the distribution toward the finer particles. Negative values denote a skewness of the distribution toward the coarser particles. A normal distribution has a skewness of zero (0).

KURTOSIS: A measure of the peakness of the distribution as calculated from the relation:

$$\text{Kurtosis} = \left[\frac{\sum f (X_i - \bar{X})^4}{100s^4} \right] - 3$$

Leptokurtic curves (positive kurtosis values) denote a particle size distribution more "peaked" than normal. Platykurtic curves (negative kurtosis values) denote a particle size distribution more "flat" than normal. A normal curve has a kurtosis value of zero (0).

Core Visual Description Sheet

VISUAL OBSERVATIONS	DEPTH (cm.)	CORE SKETCH	COLOR	LAB. NO.	SAMPLE INTERVAL (cm.)	SEDIMENT TYPE (Visual)	
0-11 cm: Hydrogen Sulfide odor. Contains many small rock and shell fragments up to 2 cm in diameter. One very tough string of organic matter wound through the interval, 1.6 cm long, 2-3 cm in diameter. Contains some small (2-3) pockets of clay. Gradational change in color and texture.			N21	557-1	0 - 6.5	Clay Sand Gravel	
	- 5				557-2	6.5 - 11	
	- 10						
11-19 cm: Homogenous with diminished H ₂ S odor. Very small amount of shell fragments. Gradational change in texture.			SGY4/1	557-3	11 - 19	Sand Silt Clay	
	- 15						
					557-4	19 - 29	Clayey Silt
19-33 cm: Homogenous. Similar to previous interval, but slightly coarser grained.	- 20						
	- 25						
	- 30				557-5	29 - 33	

Core Number 1

Bottom Sediment Analysis Summary

Engineering and Mass Physical Properties

LAB ITEM NUMBER: 557 CORE NUMBER: M6

CRUISE NUMBER: RUMMS LATITUDE: 36 59.2 N MARSDEN SQUARE: 116 CORE TYPE: DATE CORE TAKEN: 2AUG81
SHIP NAME: LONGITUDE: 76 11.8 W WATER DEPTH: 10.0 M CORE LENGTH: 33.0 CM DATE ANALYZED: APR82

SAMPLING INTERVAL (CM) FROM: 0 6.5 11.0 19.0 29.0
TO: 6.5 11.0 19.0 29.0 33.0

NET UNIT WEIGHT (GRAMS/CCM): 1.78 1.74 1.71 1.80 1.66
SPECIFIC GRAVITY OF SOLIDS: 2.67 2.67 2.67 2.67 2.67
WATER CONTENT (DRY WEIGHT): 42.4 46.9 53.1 41.4 56.7
VOID RATIO: 1.132 1.252 1.388 1.094 1.514
SATURATED VOID RATIO: 1.132 1.252 1.418 1.135 1.514
POROSITY (%): 53.10 55.60 58.10 52.20 60.22

COHESION
NATURAL (CM/50 CM): 33.3 55.8
REMOLD (CM/50 CM): 11.9 11.9

SENSITIVITY: 7.40 4.70

REMARKS:

*CALCULATED, ASSUMING 100% SATURATION, FROM THE RELATIONSHIP:
NET UNIT WEIGHT = SP. GRV * (1 + (MOISTURE / 100)) / (1 + (SP. GRV + (MOISTURE / 100)))

Sediment Size and Composition Data

CRUISE RUMMS	TAKEN 2AUG81	LATITUDE 36 59.20 N	MARSDEN SQUARE 116	LENGTH 33.0	ANALYZED APR82
SAMPLE NO	DEPTH 10.0	LONGITUDE 76 11.80 W	CORE TYPE	PENETRATION	
	DEPTH INTERVAL	557-1	557-2	557-3	557-4
		0-6.5	6.5-11.0	11.0-19.0	19.0-29.0
DIAM (PHI)	DIAM (MM)	PERCENT	PERCENT	PERCENT	PERCENT
<-4	>16.000	.000	.000	.000	.000
-4 TO -3	16.000 TO 8.000	.000	.000	.000	.000
-3 TO -2	8.000 TO 4.000	3.842	.507	.000	.000
-2 TO -1	4.000 TO 2.000	1.557	.956	.000	.000
-1 TO 0	2.000 TO 1.000	2.584	2.716	.014	.000
0 TO 1	1.000 TO .500	5.995	5.970	.076	.021
1 TO 2	.500 TO .250	12.984	10.388	.396	.045
2 TO 3	.250 TO .125	10.104	12.708	2.309	2.214
3 TO 4	.125 TO .063	20.040	19.910	34.285	25.761
4 TO 5	.063 TO .031	9.234	7.702	9.311	6.471
5 TO 6	.031 TO .016	3.610	4.958	0.213	9.112
6 TO 7	.016 TO .008	2.491	4.090	4.154	5.046
7 TO 8	.008 TO .004	1.987	3.463	3.390	4.334
8 TO 9	.004 TO .002	2.954	2.974	2.961	2.942
9 TO 10	.002 TO .001	1.623	2.418	2.149	2.385
>10	<.001	19.974	21.741	32.662	28.390
GRAVEL (2.0-6.3 MM)		5.304	1.463	.000	.000
SAND (2.0-.063 MM)		57.767	51.373	37.160	43.003
SILT (.063-.004 MM)		13.203	20.209	26.049	31.680
CLAY (<.004 MM)		23.551	26.958	37.771	35.139
MEAN (MM)		.4488	.0303	.0107	.0128
MEAN (PHI)		4.388	9.047	6.546	6.713
STANDARD DEVIATION		3.777	7.601	3.102	3.000
SKEWNESS		.229	.170	.136	.110
KURTOSIS		-.811	-1.124	-1.667	-1.656
COLOR (BSA)		N2/	56V4/1	56V4/1	56V4/1

Core Number 1

Compressional Wave Velocity

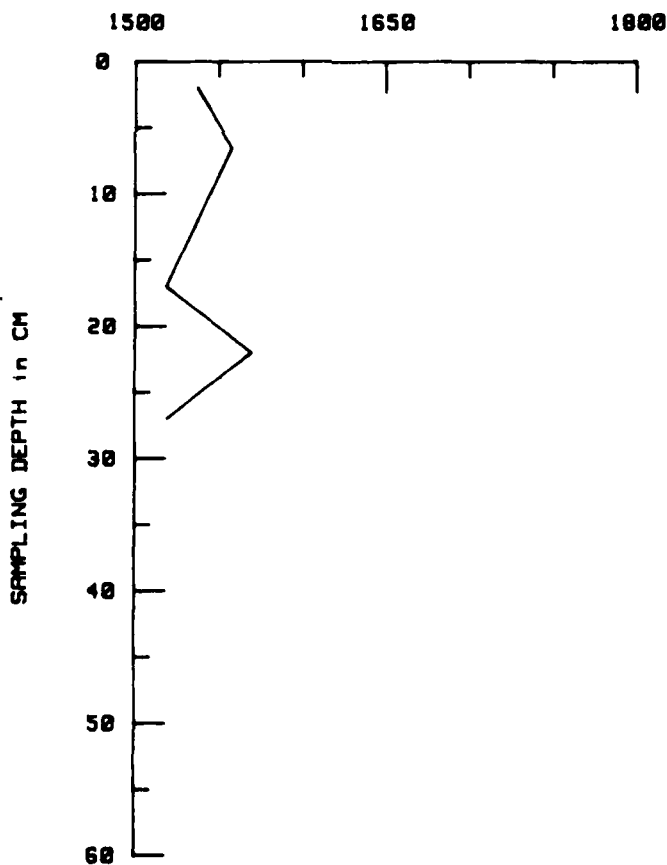
Lab Item: 557 Core: 1 (M6)

Cruise Number: BURMMS Latitude : 36 59.2 N Date Analyzed : 2 Aug 81
Ship: CGC Madrona Longitude: 76 11.8 W Date Completed : Aug 81

Insitu Salinity: 24.63 ppt Insitu Temperature: 14.55C water Depth: 10.0M
Sound Velocity of Bottom Water: 1493 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
2.0	1536	1538	1537
6.5	1553	1564	1558
12.0	1542	1533	1537
17.0	1511	1526	1519
22.0	1553	1587	1570
27.0	1519	1519	1519

in M/SEC
at INSITU CONDITIONS



Core Number 1

Compressional Wave Velocity, Continued

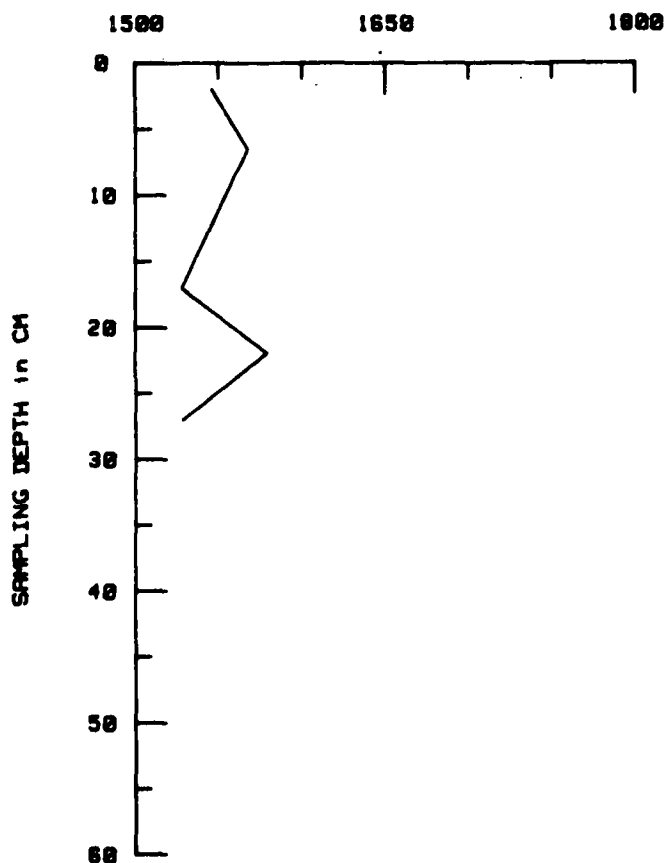
Lab Item: 557 Core: 1 (M6)

Cruise Number: BURMMS Latitude : 36 59.2 N Date Analyzed : 2 Aug 81
Ship: CGC Madrona Longitude: 76 11.8 W Date Completed : Aug 81

Insitu Salinity: 28.84 ppt Insitu Temperature: 17.31C Water Depth: 10.0M
Sound Velocity of Bottom water: 1507 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
2.0	1545	1547	1546
6.5	1562	1573	1567
12.0	1551	1542	1547
17.0	1521	1535	1528
22.0	1562	1596	1579
27.0	1529	1529	1529

in M/SEC
at INSITU CONDITIONS



Core Number 1

Compressional Wave Velocity, Continued

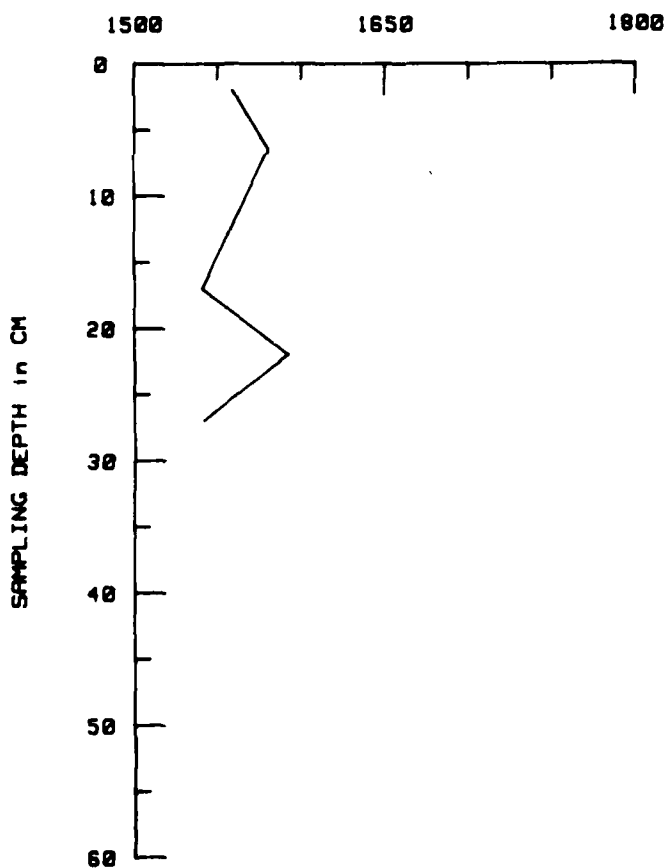
Lab Item: 557 Core: 1 (M6)

Cruise Number: BURMMS Latitude: 36 59.2 N Date Analyzed: 2 Aug 81
Ship: CGC Maclona Longitude: 76 11.8 W Date Completed: Aug 81

Insitu Salinity: 31.84 ppt Insitu Temperature: 21.83C Water Depth: 10.0M
Sound Velocity of Bottom Water: 1523 M/Sec

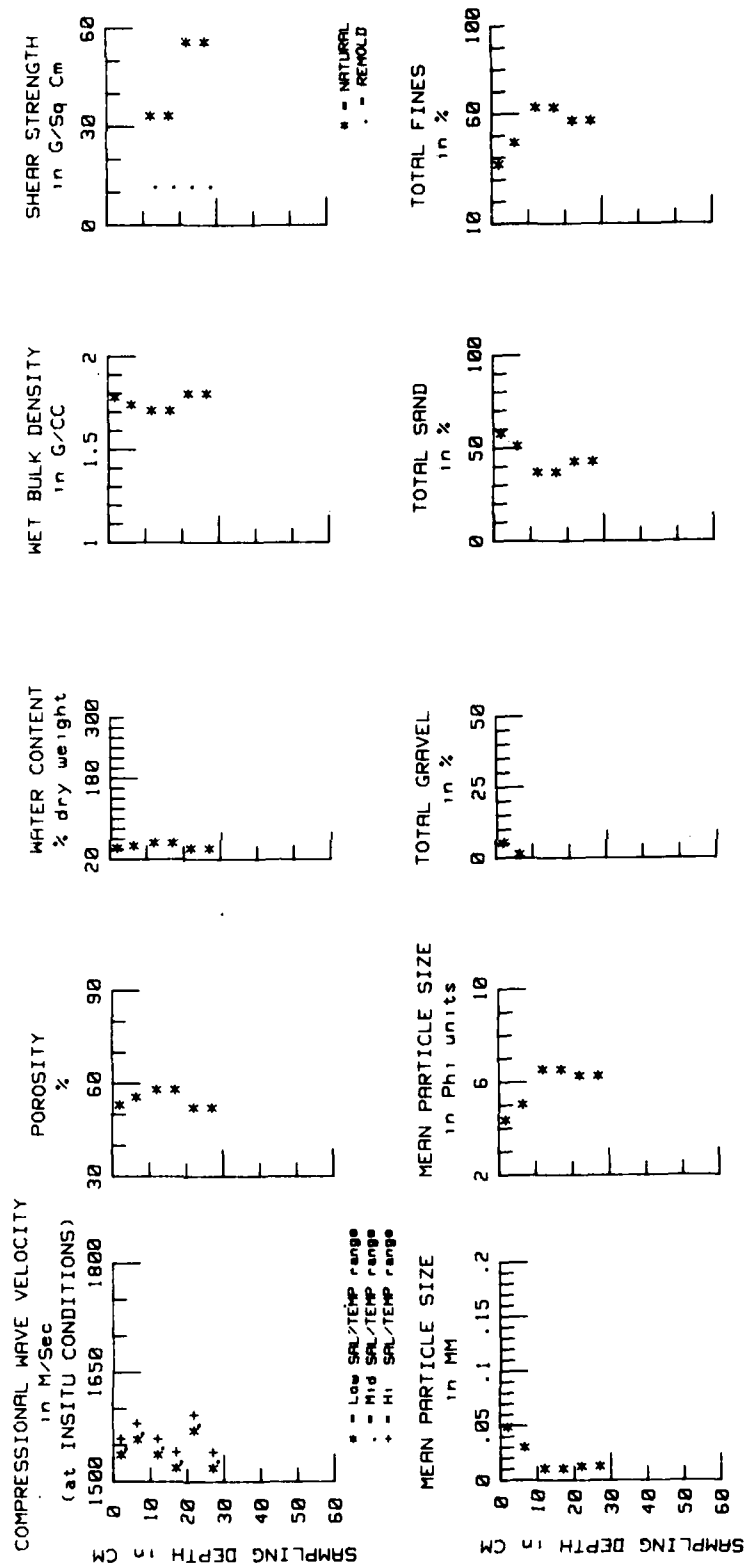
Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
2.0	1558	1560	1559
6.5	1575	1586	1580
12.0	1564	1555	1559
17.0	1533	1548	1541
22.0	1575	1609	1592
27.0	1541	1541	1541

in M/SEC
at INSITU CONDITIONS



Core Number 1

SUMMARY of ACOUSTIC AND SEDIMENT MEASUREMENTS for Lab Item: 557 Core: 1 (M6)



Core Visual Description Sheet

LABORATORY REPORT 557
WATER DEPTH UNKNOWN
SAMPLER TYPE DIVER (2 1/2")
DATE AUGUST 1982

VISUAL OBSERVATIONS	DEPTH (cm.)	CORE SKETCH	COLOR	LAB. NO.	SAMPLE INTERVAL (cm.)	SEDIMENT TYPE (Visual)
0-17 cm. Soft and homogeneous, becoming firmer below 4 cm, then softer again from 10 to 15 cm. Very small amount of shells and shell fragments. Gradational change in color.	5		SGY3/1	557-6	0 - 8	Clayey silt
	10			557-7	8 - 17	
	15			557-8	17 - 27	
17-27 cm. Homogeneous, with more sand size grains than previous interval. Gradational change in texture.	20		SGY4/1	557-9	27 - 37	Silty sand
	25					
	30					
27-37 cm. Homogeneous, except for gradational coarsening downward. Gradational change in color.	35		SGY3/1	557-10	37 - 47	
	40					
	45			557-11	47 - 53	
37-53 cm. Homogeneous.	50					

Core Number 2

Bottom Sediment Analysis Summary

Engineering and Mass Physical Properties

LAB ITEM NUMBER: 557 CORE NUMBER: 04

CRUISE NUMBER: BURPMS LATITUDE : MARSDEN SQUARE: 114 CORER TYPE : DATE CORE TAKEN: 3AUG81
SHIP NAME: LONGITUDE: WATER DEPTH : 10.0 M CORE LENGTH: 53.0 CM DATE ANALYZED : APR82

SAMPLING INTERVAL (CM) FROM: 0 8.0 17.0 27.0 37.0 47.0
TO : 8.0 17.0 27.0 37.0 47.0 53.0

WET UNIT WEIGHT (GRAMS/CCM): 1.76 1.67 1.81 1.76 1.79 1.90
SPECIFIC GRAVITY OF SOLIDS : 2.67 2.67 2.67 2.67 2.67 2.67
WATER CONTENT (DRY WEIGHT): 44.4 55.6 49.3 45.0 41.6 31.7
VOID RATIO : 1.185 1.485 1.049 1.201 1.111 0.866
SATURATED VOID RATIO : 1.185 1.485 1.049 1.201 1.111 0.866
POROSITY(X) : 54.24 59.75 51.20 56.58 52.62 45.84
COHESION
NATURAL (GM/SG CM): 57.0 59.4 56.8
REHOLD (GM/SG CM): 13.1 11.6 7.1

SENSITIVITY : 4.36 5.00 7.70

REMARKS:

*CALCULATED, ASSUMING 100% SATURATION, FROM THE RELATIONSHIP:
WET UNIT WEIGHT = SP. GRV * (1 + (MOISTURE / 100)) / (1 + (SP. GRV + (MOISTURE / 100)))

Sediment Size and Composition Data

CRUISE BURPMS SAMPLE DN	TAKEN 3AUG81 DEPTH	LATITUDE LONGITUDE	MARSDEN SQUARE CORER TYPE	LENGTH PENETRATION	53.0	ANALYZED	APR82
	SUBSAMPLE TO DEPTH INTERVAL	557 6 0-8.0	557 7 8.0-17.0	557 8 17.0-27.0	557 9 27.0-37.0	557 10 37.0-47.0	557 11 47.0-53.0
DIA (PHI)	DIA (MM)	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
<-4	>16.000	.000	.000	.000	.000	.000	.000
-4 TO -3	16.000 TO 8.000	.000	.000	.000	.000	.000	.000
-3 TO -2	8.000 TO 4.000	.000	.000	.000	.000	.000	.000
-2 TO -1	4.000 TO 2.000	.170	.000	.007	.137	.000	.008
-1 TO 0	2.000 TO 1.000	.034	.081	.329	.183	.023	.024
0 TO 1	1.000 TO .500	.273	.366	1.717	.275	.047	.024
1 TO 2	.500 TO .250	.920	1.300	6.892	.641	.117	.071
2 TO 3	.250 TO .125	2.761	7.518	8.022	1.923	2.993	2.640
3 TO 4	.125 TO .063	34.254	36.149	42.555	54.716	55.272	65.582
4 TO 5	.063 TO .031	11.202	11.210	9.386	11.767	13.467	7.731
5 TO 6	.031 TO .016	6.442	5.890	4.117	3.800	4.162	3.306
6 TO 7	.016 TO .008	5.010	4.021	2.494	2.473	2.639	2.284
7 TO 8	.008 TO .004	4.226	5.483	2.211	2.060	2.408	2.069
8 TO 9	.004 TO .002	3.408	.853	1.788	1.234	2.106	1.832
9 TO 10	.002 TO .001	2.204	7.356	1.411	1.099	1.683	1.427
>10	<.001	28.937	29.775	19.031	19.689	15.104	14.962
	GRAVEL (>2.0 MM)	.170	.000	.007	.137	.000	.008
	SAND (2.0-.063 MM)	38.241	40.414	59.515	57.738	58.452	66.342
	SILT (.063-.004 MM)	26.460	26.604	18.207	23.101	22.656	19.390
	CLAY (<.004 MM)	34.628	37.981	22.230	22.024	18.892	18.221
	MEAN (MM)	.0124	.0129	.0303	.0254	.0287	.0315
	MEAN (PHI)	6.330	6.273	5.061	5.302	5.122	4.987
	STANDARD DEVIATION	3.079	3.110	3.042	2.839	2.621	2.624
	SKEWNESS	.164	.190	.436	.524	.640	.688
	KURTOSIS	-1.496	-1.524	-.619	-.479	.012	.233
	COLOR (BSA)	56Y3/2	56Y3/1	56Y4/1	56Y4/1	56Y3/1	56Y3/1

Core Number 2

Compressional Wave Velocity

Lab Item: 557 Core: 2 (D4)

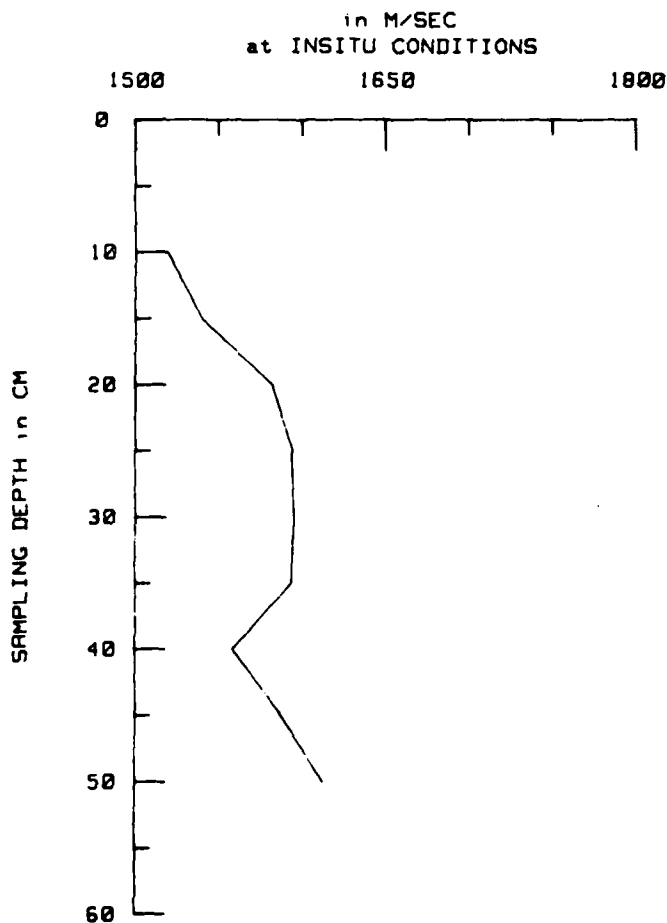
Cruise Number: BURMMS
Ship: CGC Madrona

Latitude :
Longitude:

Date Analyzed : 3 Aug 61
Date Completed : Aug 61

Insitu Salinity: 24.63 ppt Insitu Temperature: 14.55C water Depth: 10.0M
Sound Velocity of Bottom water: 1493 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
10.0	1519	1519	1519
15.0	1536	1544	1540
20.0	1582	1582	1582
25.0	1618	1570	1594
30.0	1587	1603	1595
35.0	1591	1596	1594
40.0	1556	1561	1559
45.0	1587	1587	1587
50.0	1613	1613	1613



Core Number 2

Compressional Wave Velocity, Continued

Lab Item: 557 Core: 2 (D4)

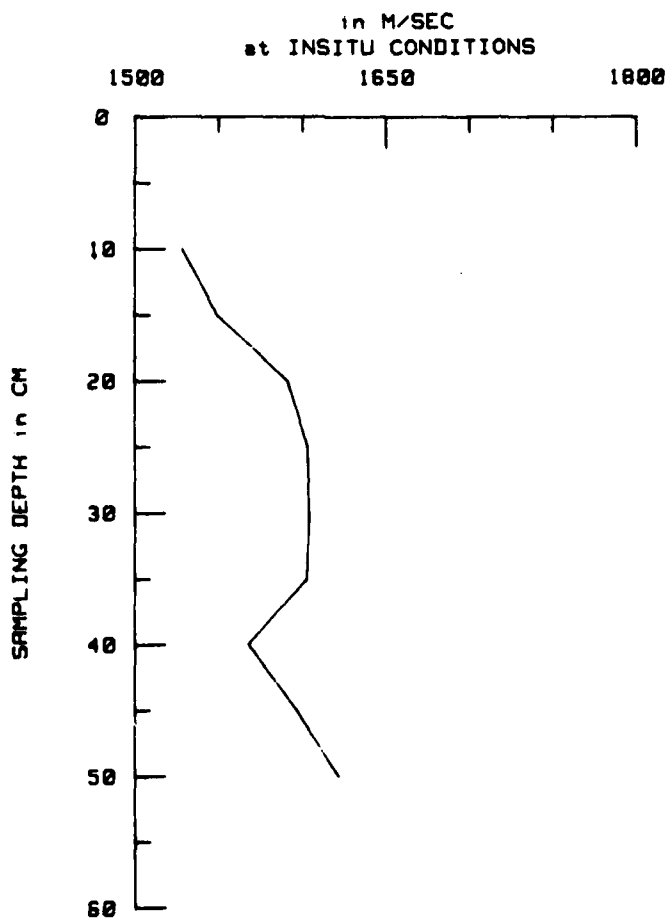
Cruise Number: SURMMS
Ship: CGC Maclona

Latitude :
Longitude:

Date Analyzed : 3 Aug 81
Date Completed : Aug 81

In situ Salinity: 24.84 ppt In situ Temperature: 17.31C water Depth: 10.0M
Sound Velocity of Bottom water: 1507 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
10.0	1529	1529	1529
15.0	1545	1553	1549
20.0	1591	1591	1591
25.0	1627	1579	1603
30.0	1597	1612	1604
35.0	1600	1605	1603
40.0	1565	1570	1568
45.0	1597	1597	1597
50.0	1622	1622	1622



Core Number 2

Compressional Wave Velocity, Continued

Lab Item: 557 Core: 2 (D4)

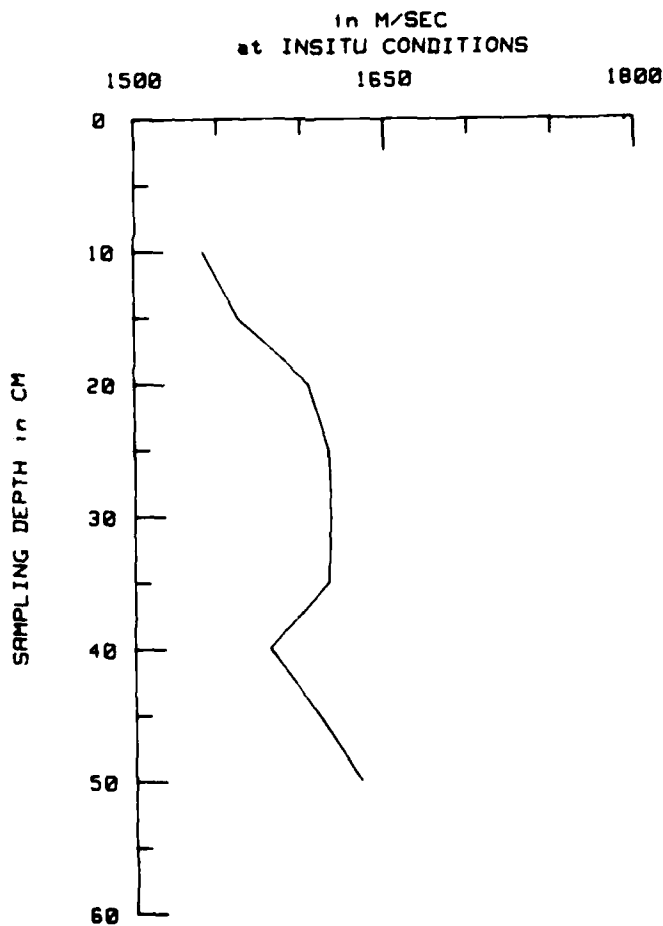
Cruise Number: BURMMS
Ship: CGC Madrona

Latitude :
Longitude:

Date Analyzed : 3 Aug 81
Date Completed : Aug 81

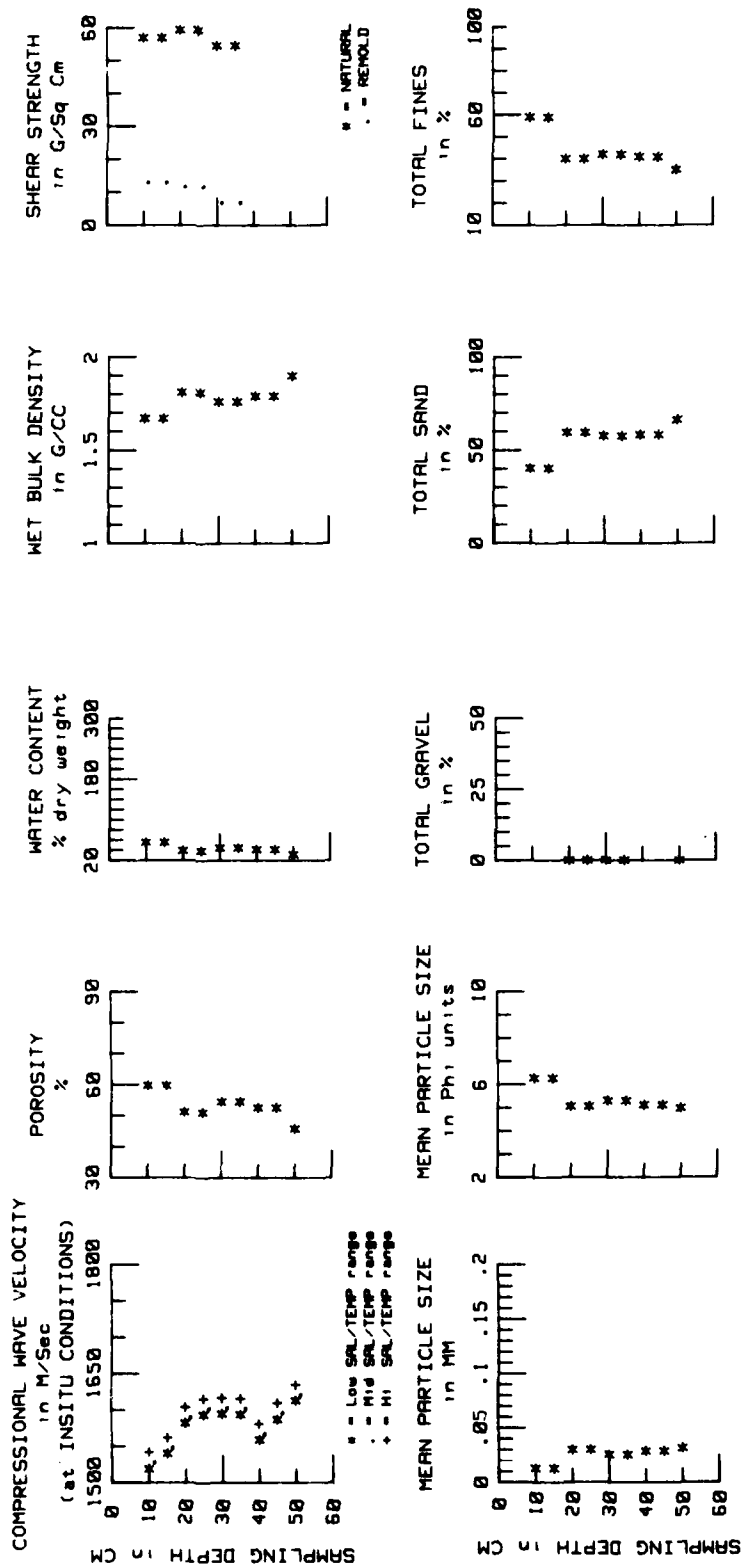
Insitu Salinity: 31.84 ppt Insitu Temperature: 21.83C Water Depth: 10.0M
Sound Velocity of Bottom Water: 1523 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
10.0	1542	1542	1542
15.0	1558	1566	1562
20.0	1604	1604	1604
25.0	1640	1592	1616
30.0	1610	1625	1617
35.0	1613	1618	1616
40.0	1578	1583	1581
45.0	1610	1610	1610
50.0	1635	1635	1635



Core Number 2

SUMMARY of ACOUSTIC AND SEDIMENT MEASUREMENTS for Lab Item: 557 Core: 2 (D4)



Core Number 3

Core Visual Description Sheet

SAMPLE CORE 3
 LATITUDE: 36°59.2'N
 CORE LENGTH: 34 cm
 DATE TAKEN: 3 AUG 81

LABORATORY REPORT: 557
 LONGITUDE: 76°10.7'W
 CORE PENETRATION: UNKNOWN
 ANALYST: L. H. REYNOLDS

WATER DEPTH: 10 m

SAMPLER TYPE: DIVER (2 1/2")

DATE: AUG 1981

VISUAL OBSERVATIONS	DEPTH (cm.)	CORE SKETCH	COLOR	LAB. NO.	SAMPLE INTERVAL (cm.)	SEDIMENT TYPE (Visual)
0-7 cm: Soft near the surface, becoming stiffer with depth. A small amount of shell fragments decreasing downward to no shell fragments. Gradational change in color and texture.	5		SG3/1	557-12	0 - 7	Sandy silt
7-15 cm: Homogenous with very small amount of shell fragments and well-rounded gravel. Gradational change due to disappearance of shell fragments and gravel.	10		SG3/1	557-13	7 - 15	Clayey silt
15-34 cm: Homogenous.	15			557-14	15 - 25	
	20					
	25			557-15	25 - 34	
	30					
	35					

Core Number 3

Bottom Sediment Analysis Summary

Engineering and Mass Physical Properties

LAB ITEM NUMBER: 557 CORE NUMBER: D3

CRUISE NUMBER: RUMMS LATITUDE: 36 50.2 N MARSDEN SQUARE: 116 CORE TYPE: DATE CORE TAKEN: 3AUG81
SHIP NAME: LONGITUDE: 76 10.7 W WATER DEPTH: 10.0 M CORE LENGTH: 34.0 CM DATE ANALYZED: APR82

SAMPLING INTERVAL (CM) FROM: 0 7.0 15.0 25.0
TO: 7.0 15.0 25.0 34.0

NET UNIT WEIGHT (GFAMS/CCM): 1.82 1.74 1.86 1.85
SPECIFIC GRAVITY OF SOLIDS: 2.67 2.67 2.67 2.67
WATER CONTENT (XDY WEIGHT): 39.2 47.6 35.6 36.0
VOID RATIO: 0.047 0.1271 0.051 0.061
SATURATED VOID RATIO: 0.047 0.1271 0.051 0.061
POROSITY (%): 0.5114 0.5596 0.0873 0.4901

COHESION
NATURAL (CM/50 CM): 41.6 61.8 29.7
REMOLD (CM/50 CM): 9.5 8.3 10.7

SENSITIVITY: 4.38 7.43 2.78

REMARKS:

*CALCULATED, ASSUMING 100% SATURATION, FROM THE RELATIONSHIP:
NET UNIT WEIGHT = SP. GRV * (1 + (MOISTURE / 100)) / 1 + (SP. GRV + (MOISTURE / 100))

Sediment Size and Composition Data

CRUISE RUMMS SAMPLE D3	TAKEN 3AUG81 DEPTH 10.0	LATITUDE 76 50.20 N LONGITUDE 76 10.70 W	MARSDEN SQUARE 116 CORE TYPE	LENGTH PENETRATION	34.0	ANALYZED	APR82
	SUBSAMPLE ID. DEPTH INTERVAL	557 12 0-7.0	557 13 7.0-15.0	557 14 15.0-25.0	557 15 25.0-34.0		
DIAM (PHI)	DIAM (MM)	PERCENT	PERCENT	PERCENT	PERCENT		
< 4	> 16.000	.000	.000	.000	.000		
-4 TO -3	16.000 TO 8.000	.000	.000	.000	.000		
-3 TO -2	8.000 TO 4.000	.000	1.536	.000	.000		
-2 TO -1	4.000 TO 2.000	.000	.038	.000	.063		
-1 TO 0	2.000 TO 1.000	.041	.038	.023	.000		
0 TO 1	1.000 TO .500	.124	.133	.137	.063		
1 TO 2	.500 TO .250	.448	.184	.524	.190		
2 TO 3	.250 TO .125	2.863	1.997	2.550	1.463		
3 TO 4	.125 TO .063	43.029	40.783	55.497	57.221		
4 TO 5	.063 TO .031	13.112	9.928	10.380	12.191		
5 TO 6	.031 TO .016	6.598	6.836	4.234	3.463		
6 TO 7	.016 TO .008	4.232	4.839	3.437	2.692		
7 TO 8	.008 TO .004	3.568	4.570	2.969	2.748		
8 TO 9	.004 TO .002	2.739	2.995	2.123	1.773		
9 TO 10	.002 TO .001	2.324	2.803	2.231	1.678		
> 10	< .001	20.871	23.080	15.866	16.054		
	GRAVEL (> 2.0 MM)	.000	1.575	.000	.063		
	SAND (2.0-.063 MM)	46.556	43.318	58.730	59.436		
	SILT (.063-.004 MM)	27.510	26.229	21.011	20.099		
	CLAY (< .004 MM)	25.934	28.879	20.260	19.506		
	MEAN (MM)	.0180	.0171	.0268	.0283		
	MEAN (PHI)	5.726	5.871	5.222	5.155		
	STANDARD DEVIATION	2.865	1.098	2.697	2.665		
	SKEWNESS	.386	.147	.572	.623		
	KURTOSIS	-1.037	-.743	-.310	-.083		
	COLOR (BSA)	563/1	563/1	563/1	563/1		

Core Number 3

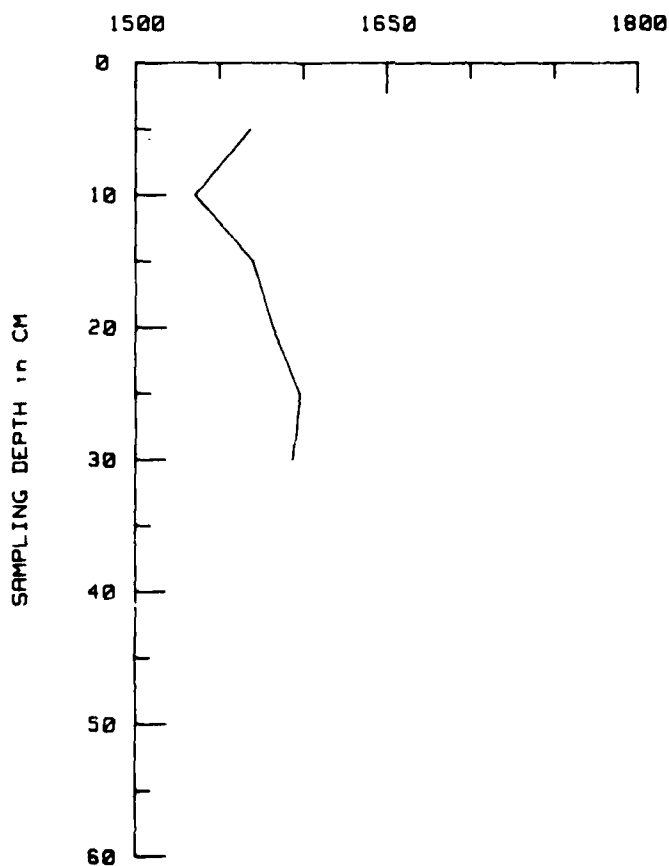
Compressional Wave Velocity

Lab Item: 557 Core: 3 (D3)

Cruise Number: BURMMS Latitude : 36 59. 2 N Date Analyzed : 3 Aug 81
 Ship: CGC Madrona Longitude: 76 10. 7 W Date Completed : Aug 81
 Insitu Salinity: 24.63 ppt Insitu Temperature: 14.55C water Depth: 10.0M
 Sound Velocity of Bottom Water: 1493 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1572	1565	1568
10.0	1532	1540	1536
15.0	1572	1569	1570
20.0	1598	1565	1562
25.0	1601	1595	1598
30.0	1578	1610	1594

in M/SEC
at INSITU CONDITIONS



Core Number 3

Compressional Wave Velocity, Continued

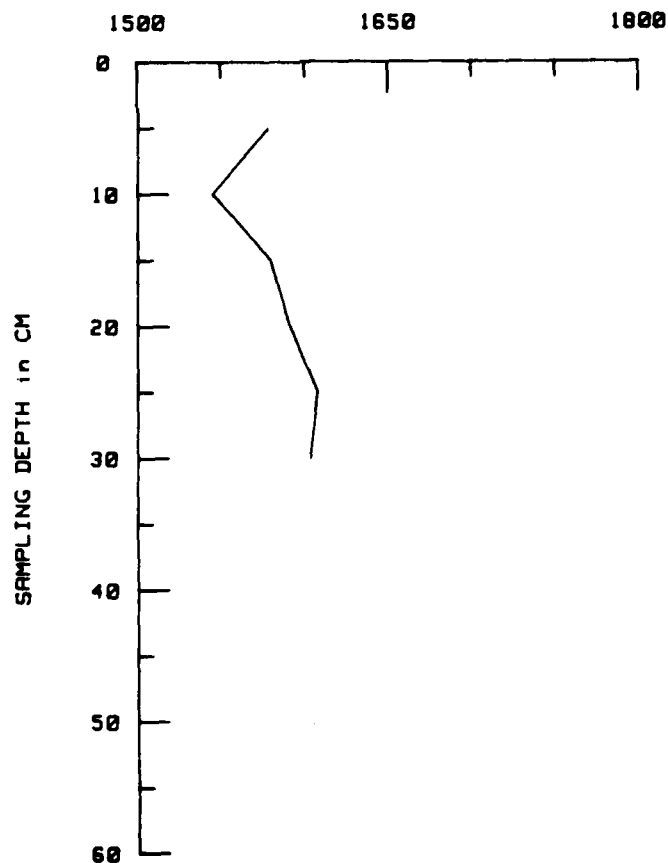
Lab Item: 557 Core: 3 (D3)

Cruise Number: BURMMS Latitude : 36 59. 2 N Date Analyzed : 3 Aug 81
Ship: CGC Madrona Longitude: 76 10. 7 W Date Completed : Aug 81

Insitu Salinity: 28.84 ppt Insitu Temperature: 17.31C water Depth: 10.0M
Sound Velocity of Bottom water: 1507 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1581	1575	1578
10.0	1541	1549	1545
15.0	1581	1578	1579
20.0	1607	1575	1591
25.0	1610	1605	1607
30.0	1587	1619	1603

In M/SEC
at INSITU CONDITIONS



Core Number 3

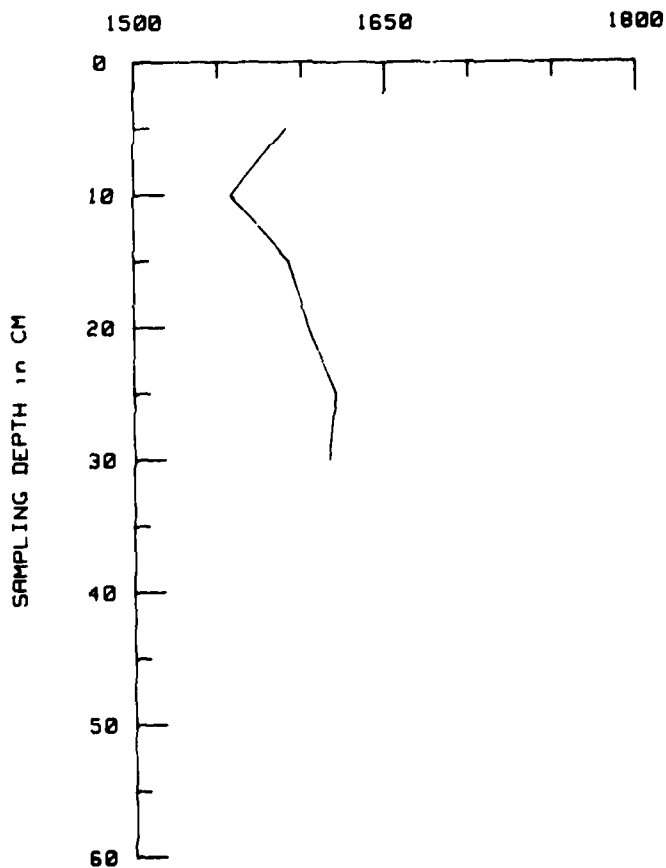
Compressional Wave Velocity, Continued

Lab Item: 557 Core: 3 (D3)

Cruise Number: BURMMS Latitude : 36 59. 2 N Date Analyzed : 3 Aug 81
 Ship: CGC Madrona Longitude: 76 10. 7 W Date Completed : Aug 81
 Insitu Salinity: 31.84 ppt Insitu Temperature: 21.83C water Depth: 10.0M
 Sound Velocity of Bottom water: 1523 M/Sec

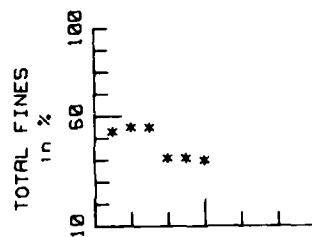
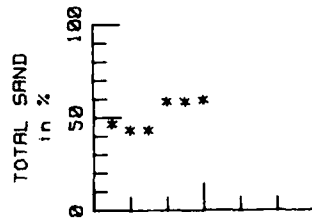
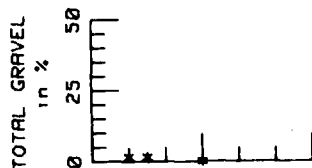
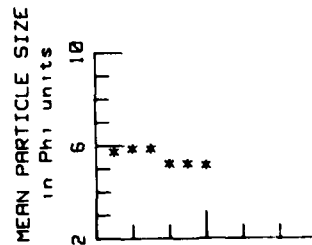
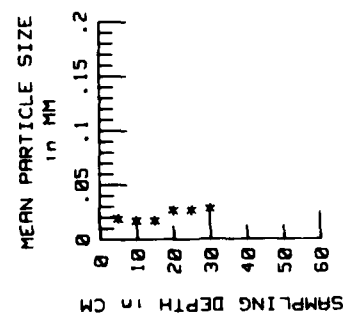
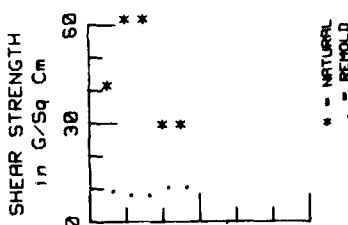
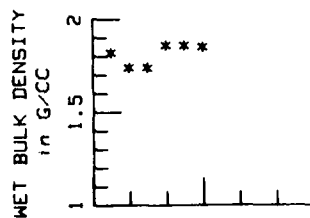
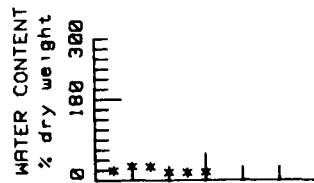
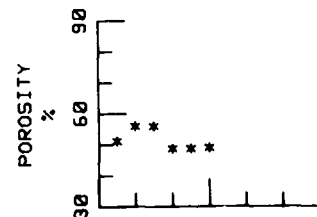
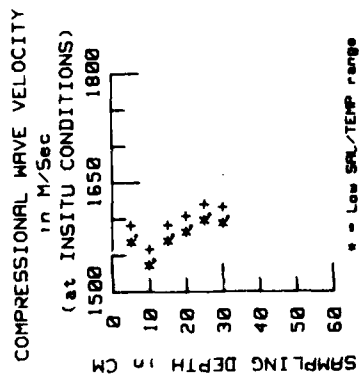
Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1594	1588	1591
10.0	1554	1562	1558
15.0	1594	1591	1592
20.0	1620	1588	1604
25.0	1623	1618	1620
30.0	1600	1632	1616

in M/SEC
at INSITU CONDITIONS



Core Number 3

SUMMARY of ACOUSTIC AND SEDIMENT MEASUREMENTS for Lab Item: 557 Core: 3 (D3)



Core Number 4

Core Visual Description Sheet

SAMPLE CORE 4
 LABORATORY REPORT 557
 LONGITUDE 76°10.8'W
 WATER DEPTH 10 m
 LATITUDE 36°59.2'N
 CORE PENETRATION UNKNOWN
 SAMPLER TYPE DIVER (2 1/2")
 CORE LENGTH 39 cm
 ANALYST L. M. REYNOLDS
 DATE AUGUST 1981

VISUAL OBSERVATIONS	DEPTH (cm.)	CORE SKETCH	COLOR	LAB. NO.	SAMPLE INTERVAL (cm.)	SEDIMENT TYPE (Visual)
0-2.5 cm: Very soft. Very small amount of rock and shell fragments. Slight Hydrogen Sulfide odor. Distinct change in color and texture.	0-2.5		5Y4/1	557-16	0 - 2.5	Clay Sand Gravel
2.5-7/10 cm: Homogenous. Much stiffer than previous interval. Slight Hydrogen Sulfide odor. Distinct change in color and texture.	2.5-7/10		N3	557-17	2.5 - 5	Silty Clay
7/10-13 cm: Shell fragments in a silty sand matrix. Shell fragments of up to 2 cm (intermediate axis). Gradational change in color and texture.	7/10-13		5G7/1	557-18	5 - 7/10	Silty Sand
13-17 cm: A small amount of well-rounded pebbles (up to 2.5 cm diameter). A moderate amount of shell fragments. Distinct change in texture.	13-17		5B6/1	557-19	7/10 - 13	Silty Sand
17-22 cm: Homogenous. Gradational change in color.	17-22		5G4/1	557-20	13 - 17	Silt Sand Gravel
22-39 cm: Homogenous.	22-39		5G4/1	557-21	17 - 22	Clayey Silt
	25			557-22	22 - 30	
	30				30 - 39	
	35					
	39 c.					

Core Number 4

Bottom Sediment Analysis Summary

Engineering and Mass Physical Properties

LAR ITEM NUMBER: 557 CORE NUMBER:01

CRUISE NUMBER: BURNMS LATITUDE: 36 54.2 N MARSDEN SQUARE: 116 CORE TYPE: DATE CORE TAKEN: 3AUG61
SHIP NAME: LONGITUDE: 76 10.8 W WATER DEPTH: 10.0 M CORE LENGTH: 39.0 CM DATE ANALYZED: APR61

SAMPLING INTERVAL (CM) FROM: 17.0 22.0 39.0
TO: 22.0 30.0 39.0

WET UNIT WEIGHT (GFANS/CCM): 1.90 1.86 1.82
SPECIFIC GRAVITY OF SOLIDS: 2.67 2.67 2.67
WATER CONTENT (DRY WEIGHT): 32.3 35.1 39.1
VOID RATIO: .862 .937 1.044
SATURATED VOLUME RATIO: .862 .937 1.044
POROSITY: .8631 .8838 .9108
COHESION

NATURAL (CM/50 CM): 32.1
PERIOD (CM/50 CM): 7.1

SENSITIVITY: 4.50

REMARKS:

*CALCULATED, ASSUMING 100% SATURATION, FROM THE RELATIONSHIP:
WET UNIT WEIGHT = SP. GRV * (1 + (WATER / 100)) / (1 + (SP. GRV * (WATER / 100)))

Sediment Size and Composition Data

CRUISE BURNMS SAMPLE 01	TAKEN 3AUG61 DEPTH	3AUG61 10.0	LATITUDE LONGITUDE	36 59.20 N 76 10.80 W	MARSDEN SQUARE 116 CORE TYPE	LENGTH PENETRATION	39.0	ANALYZED	APP82	
	SURFAMPLER ID. DEPTH INTERVAL		557 16 0- 2.5	557 17 2.5- 5.0	557 18 5.0-10.0	557 19 10.0-15.0	557 20 15.0-17.0	557 21 17.0-22.0	557 22 22.0-30.0	557 23 30.0-39.0
DIAM (PHI)	DIAM (MM)		PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
<-4	>16.000		.000	.000	.000	.000	.000	.700	.000	.000
-4 TO -3	16.000 TO 8.000		.000	.000	.000	.744	.000	.000	.000	.700
-3 TO -2	8.000 TO 4.000		.000	.000	.000	.744	3.350	.000	.442	.700
-2 TO -1	4.000 TO 2.000		.918	.109	.743	1.132	2.849	.284	.147	.700
-1 TO 0	2.000 TO 1.000		1.399	.845	1.528	3.881	6.259	1.517	.074	.060
0 TO 1	1.000 TO .500		3.017	1.962	3.055	7.050	12.136	1.565	.110	.060
1 TO 2	.500 TO .250		5.378	2.888	4.088	9.250	14.022	1.754	.189	.149
2 TO 3	.250 TO .125		7.433	3.597	3.881	8.053	8.987	2.414	1.473	1.108
3 TO 4	.125 TO .063		47.792	28.638	32.907	27.426	24.253	48.933	52.504	67.789
4 TO 5	.063 TO .031		9.794	17.153	7.144	11.740	6.359	12.470	11.708	12.522
5 TO 6	.031 TO .016		3.279	8.093	6.111	4.366	3.430	3.698	4.234	3.796
6 TO 7	.016 TO .008		2.143	5.804	4.377	2.684	2.367	3.129	3.203	2.331
7 TO 8	.008 TO .004		1.793	4.764	4.500	2.167	2.227	2.608	3.240	1.494
8 TO 9	.004 TO .002		.962	4.223	2.973	1.908	1.545	1.328	2.246	1.345
9 TO 10	.002 TO .001		1.355	2.943	2.684	1.423	1.344	1.754	2.320	1.494
>10	<.001		14.735	24.977	25.970	17.432	10.873	18.540	18.115	12.851
	GRAVEL (2.0-6.3 MM)		.918	.109	.743	2.620	6.199	.284	.589	.700
	SAND (2.0-.063 MM)		65.020	37.929	45.458	55.667	65.657	56.188	54.345	64.166
	SILT (.063-.004 MM)		17.609	30.817	22.172	20.957	14.383	21.906	22.386	20.143
	CLAY (<.004 MM)		17.053	31.144	11.627	20.763	13.761	21.522	22.640	15.690
	MEAN (MM)		.0416	.0154	.0177	.0446	.0059	.0275	.0239	.0347
	MEAN (PHI)		4.586	6.722	5.822	4.887	3.283	5.185	5.388	6.449
	STANDARD DEVIATION		2.914	3.118	3.373	3.472	3.418	2.954	2.835	2.776
	SKEWNESS		.494	.135	.178	.247	.170	.410	.435	.479
	KURTOSIS		.140	-1.208	-1.222	-1.542	-1.247	-1.454	-1.475	.865
	COLOR (GSA)		SYN/1	N3/	N3/	5EY4/1	5HG4/1	SP4/1	FLY4/1	SYN4/1

Core Number 4

Compressional Wave Velocity

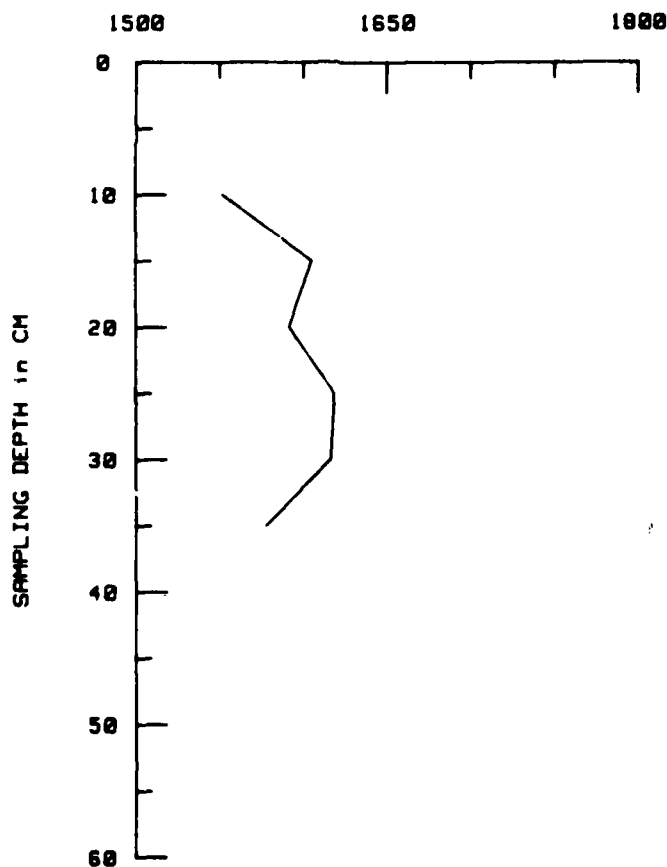
Lab Item: 557 Core: 4 (D1)

Cruise Number: BURMMS Latitude : 36 59.2 N Date Analyzed : 3 Aug 81
Ship: CGC Maconna Longitude: 76 10.8 W Date Completed : Aug 81

Insitu Salinity: 24.63 ppt Insitu Temperature: 14.55C Water Depth: 10.0M
Sound Velocity of Bottom Water: 1493 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
10.0	1548	1556	1552
15.0	1598	1612	1605
20.0	1591	1591	1591
25.0	1613	1623	1618
30.0	1635	1598	1616
35.0	1560	1595	1578

in M/SEC
at INSITU CONDITIONS



Core Number 4

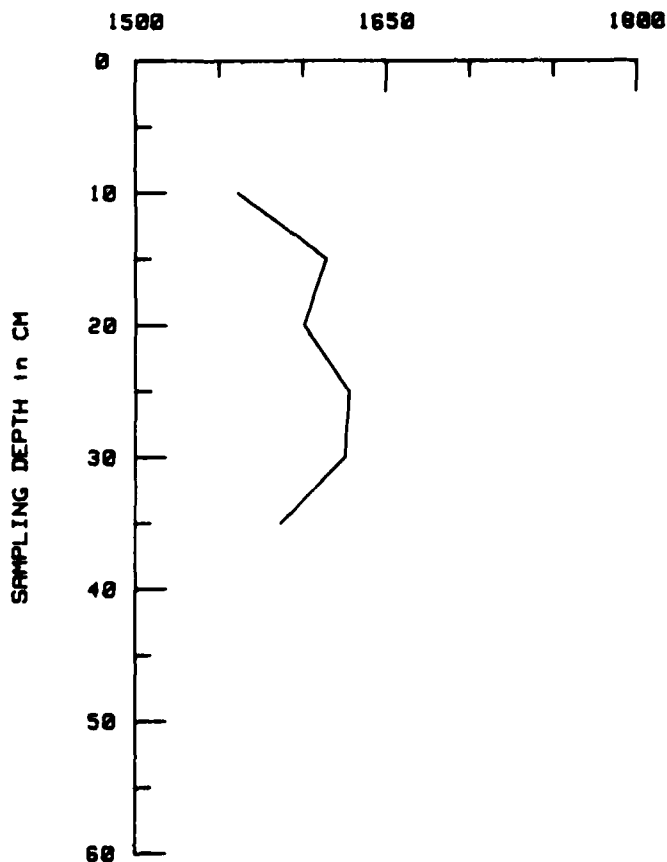
Compressional Wave Velocity, Continued

Lab Item: 557 Core: 4 (D1)

Cruise Number: BURMMS Latitude: 36 59.2 N Date Analyzed: 3 Aug 81
 Ship: CGC Madrona Longitude: 76 10.8 W Date Completed: Aug 81
 Insitu Salinity: 28.84 ppt Insitu Temperature: 17.31C Water Depth: 10.0M
 Sound Velocity of Bottom Water: 1507 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
10.0	1557	1566	1561
15.0	1607	1621	1614
20.0	1601	1601	1601
25.0	1622	1633	1628
30.0	1644	1607	1625
35.0	1569	1604	1587

in M/SEC
at INSITU CONDITIONS



Core Number 4

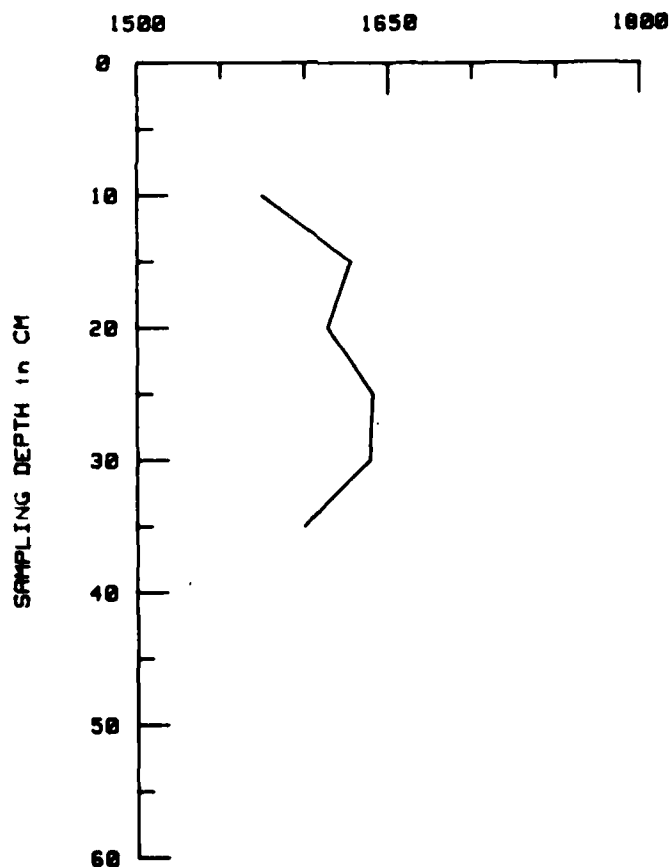
Compressional Wave Velocity, Continued

Lab Item: 557 Core: 4 (D1)

Cruise Number: BURMMS Latitude : 36 59.2 N Date Analyzed : 3 Aug 81
 Ship: CGC Madrona Longitude: 76 10.8 W Date Completed : Aug 81
 Insitu Salinity: 31.84 ppt Insitu Temperature: 21.83C Water Depth: 10.0M
 Sound Velocity of Bottom Water: 1523 M/Sec

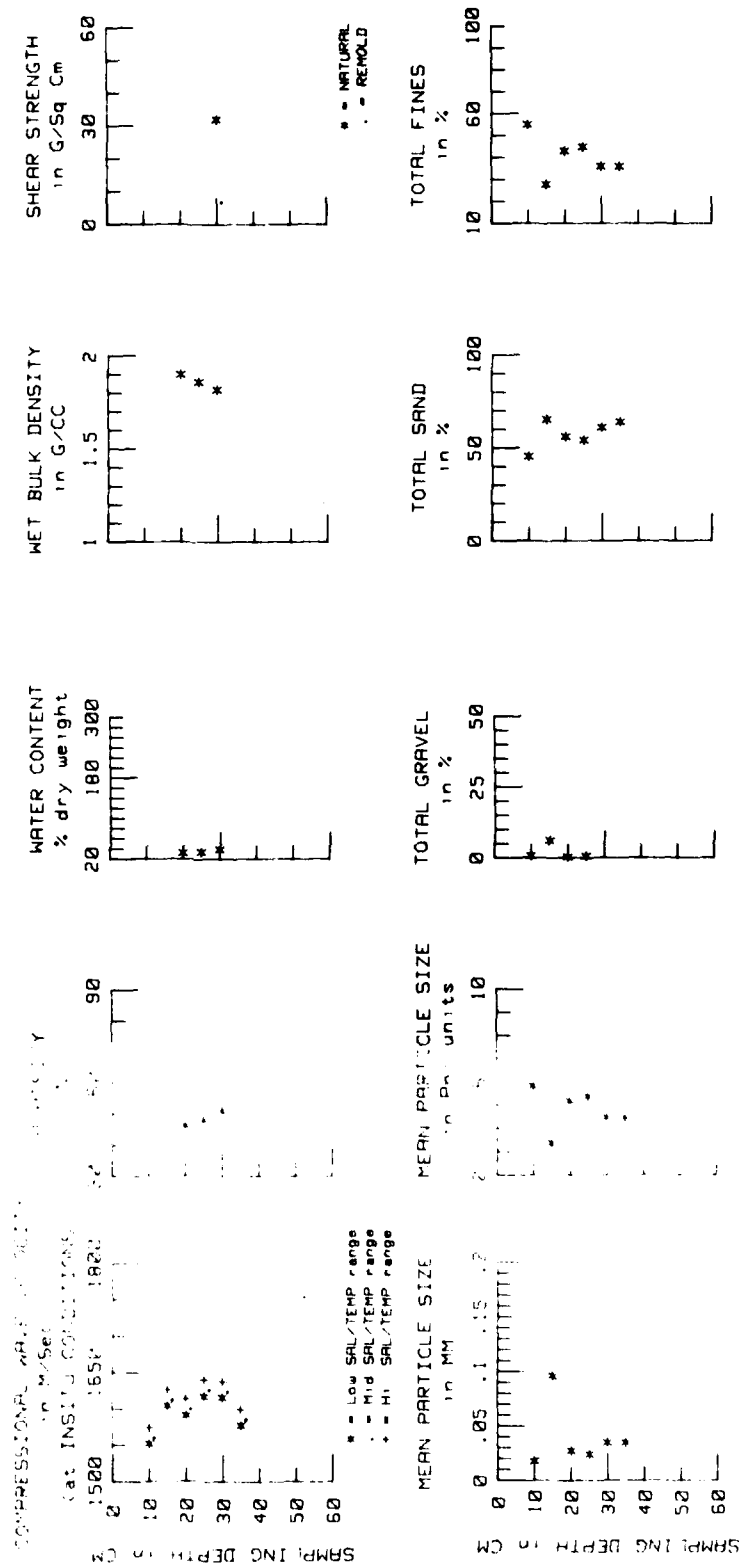
Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
10.0	1570	1579	1574
15.0	1620	1634	1627
20.0	1614	1614	1614
25.0	1635	1646	1641
30.0	1657	1620	1638
35.0	1582	1617	1600

in M/SEC
at INSITU CONDITIONS



Core Number 4

SUMMARY of AND SEDIMENT MEASUREMENTS for Core: 4 (D1)



Core Number 5

Core Visual Description Sheet

SAMPLE CORE 5
 LATITUDE 36°56.6'N
 CORE LENGTH 51 cm
 DATE TAKEN 3 AUG 81

LABORATORY REPORT 557
 LONGITUDE 76°01.9'W
 WATER DEPTH 10 m
 CORE PENETRATION: UNKNOWN
 ANALYST: L. H. REYNOLDS
 DATE AUGUST 1981

VISUAL OBSERVATIONS	DEPTH (cm.)	CORE SKETCH	COLOR	LAB. NO.	SAMPLE INTERVAL (cm.)	SEDIMENT TYPE (Visual)
0-7 cm: Homogenous. Small amount of shell fragments. Gradational change due to appearance of mottling.	5		SY4/1	557-24	0 - 7	Sand
7-17 cm: Highly mottled (SY2.5/1). Small amount of shell fragments. Gradational change due to color and texture.	10			557-25	7 - 17	
	15					
17-27 cm: Homogenous. Small amount of shell fragments. Gradational change in color.	20		SY2.5/1	557-26	17 - 27	Slurry Sand
	25					
27-37 cm: Homogenous. Small amount of shell fragments. Gradational change due to appearance of mottling.	30			557-27	27 - 37	Sand
	35					
37-51 cm: Moderately mottled (N2). Small amount of shell fragments.	40			557-28	37 - 51	
	45					
	50					
	51 cm					

Core Number 5

Bottom Sediment Analysis Summary

Engineering and Mass Physical Properties

LAB ITEM NUMBER: 557 CORE NUMBER: D2

CRUISE NUMBER: RUMMS LATITUDE: 36 56.60 N MARSDEN SQUARE: 116 CORE TYPE: DATE CORE TAKEN: 3AUG81
SHIP NAME: LONGITUDE: 76 1.9 W WATER DEPTH: 10.0 M CORE LENGTH: 51.0 CM DATE ANALYZED: APR82

SAMPLING INTERVAL (CM) FROM: 0 7.0 17.0 27.0 37.0
TO: 7.0 17.0 27.0 37.0 51.0

WET UNIT WEIGHT (GFAMS/CCM): * 2.08 * 2.08 * 2.06 * 2.06 * 2.04
SPECIFIC GRAVITY OF SOLIDS: 2.67 2.67 2.67 2.67 2.67
WATER CONTENT (WDRY WEIGHT): 20.7 20.2 21.4 21.6 22.6
VOID RATIO: * .553 * .539 * .571 * .577 * .603
SATURATED VOLT RATIO: * .553 * .539 * .571 * .577 * .603
POROSITY(%): * 35.60 * 35.04 * 36.36 * 36.58 * 37.63

REMARKS:

* CALCULATED, ASSUMING 100% SATURATION, FROM THE RELATIONSHIP:
WET UNIT WEIGHT = SP. GRV * (1 + (WMOISTURE / 100)) / (1 + (SP. GRV * (WMOISTURE / 100)))

Sediment Size and Composition Data

CRUISE	BURRMS	TAKEN	3AUG81	LATITUDE	36 56.60 N	MARSDEN SQUARE	116	LENGTH	51.0	ANALYZED	APR82
SAMPLE	D2	DEPTH	10.0	LONGITUDE	76 1.90 W	CORER TYPE		PENETRATION			
		SUBSAMPLE ID		557 24	557 25	557 26	557 27	557 28			
		DEPTH INTERVAL		0-7.0	7.0-17.0	17.0-27.0	27.0-37.0	37.0-52.0			
DIAM (PHI)		DIAM (MM)		PERCENT	PERCENT	PERCENT	PERCENT	PERCENT			
< -4		> 16.000		.000	.000	.000	.000	.000			
-4 TO -3		16.000 TO 8.000		.000	.000	.000	.000	.000			
-3 TO -2		8.000 TO 4.000		.000	.000	.108	.000	.000			
-2 TO -1		4.000 TO 2.000		.017	.041	.108	.057	.154			
-1 TO 0		2.000 TO 1.000		.243	.365	.799	.606	.437			
0 TO 1		1.000 TO .500		.4119	.4520	7.348	6.399	7.948			
1 TO 2		.500 TO .250		45.516	48.257	41.368	36.823	42.901			
2 TO 3		.250 TO .125		31.144	26.713	19.047	19.652	21.039			
3 TO 4		.125 TO .063		11.192	11.775	15.650	15.581	12.886			
4 TO 5		.063 TO .031		.817	.993	2.967	2.404	7.587			
5 TO 6		.031 TO .016		.191	.486	1.553	1.969	.000			
6 TO 7		.016 TO .008		.104	.304	.938	1.306	.000			
7 TO 8		.008 TO .004		.104	.324	.769	1.193	.000			
8 TO 9		.004 TO .002		.000	.263	.738	1.022	7.047			
9 TO 10		.002 TO .001		.174	.223	.630	.966	.000			
> 10		< .001		6.378	5.736	7.978	12.022	.000			
		GRAVEL (2.0-6.3 MM)		.017	.041	.215	.057	.154			
		SAND (0.075-2.0 MM)		92.214	91.630	84.212	79.061	85.211			
		6-149-0.075-0.004 MM)		1.217	7.008	6.226	6.872	7.587			
		CLAY (< .004 MM)		6.552	6.722	9.347	14.010	7.047			
		MEAN (MM)		.3626	.1666	.1276	.0916	.1654			
		MEAN (PHI)		2.620	2.585	2.971	3.449	2.596			
		STANDARD DEVIATION		2.236	2.214	2.653	3.043	1.942			
		SKEWNESS		1.306	1.355	.951	.745	.928			
		KURTOSIS		7.102	6.929	2.801	.892	3.307			
		COLOR (BSA)		5Y4/1	5Y4/1	5Y2.5/1	5Y2.5/1	5Y2.5/1			

Core Number 5

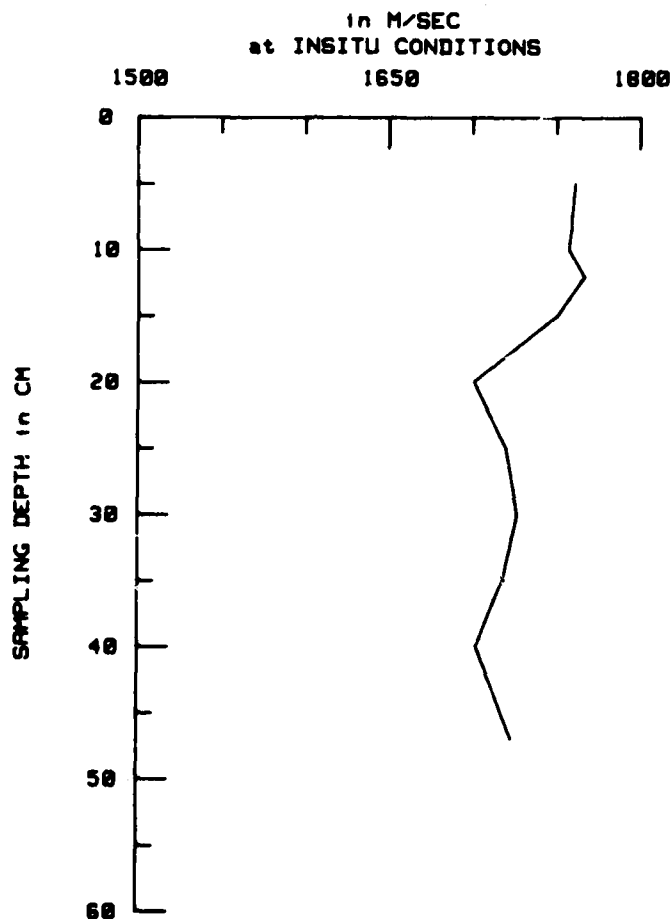
Compressional Wave Velocity

Lab Item: 557 Core: 5 (D2)

Cruise Number: BURMMS Latitude : 36 56.6 N Date Analyzed : 3 Aug 81
Ship: CGC Madrona Longitude: 76 1.9 W Date Completed : Aug 81

Insitu Salinity: 24.63 ppt Insitu Temperature: 14.55C Water Depth: 10.0M
Sound Velocity of Bottom Water: 1493 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1769	1753	1761
10.0	1750	1764	1757
12.0	1772	1761	1767
15.0	1739	1761	1750
20.0	1701	1701	1701
25.0	1711	1729	1720
30.0	1729	1725	1727
35.0	1725	1711	1718
40.0	1701	1704	1702
47.0	1722	1726	1724



Core Number 5

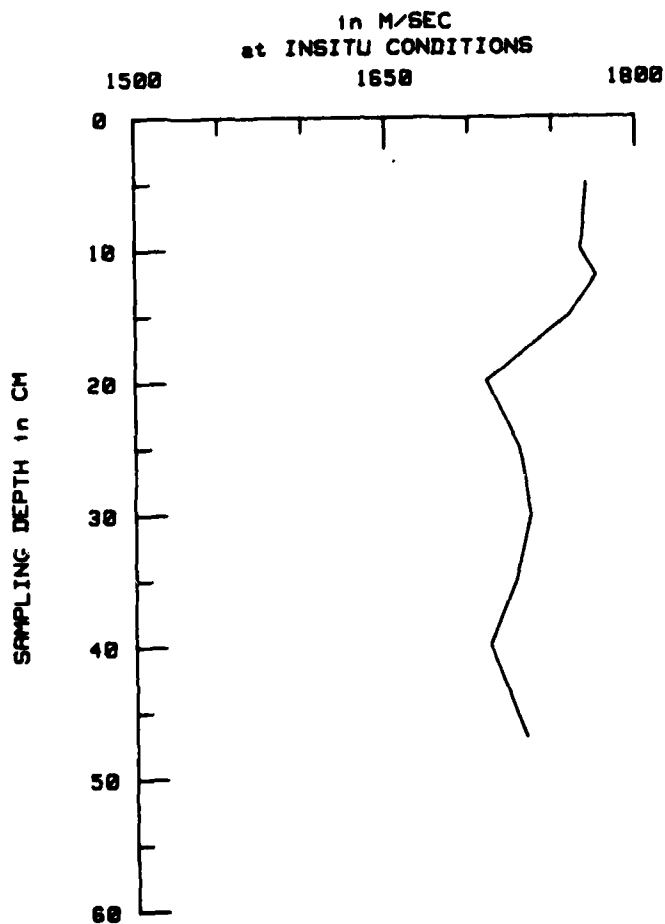
Compressional Wave Velocity, Continued

Lab Item: 557 Core: 5 (D2)

Cruise Number: BURMMS Latitude : 36 56.6 N Date Analyzed : 3 Aug 81
Ship: CGC Madrona Longitude: 76 1.9 W Date Completed : Aug 81

Insitu Salinity: 28.84 ppt Insitu Temperature: 17.31C water Depth: 10.0M
Sound Velocity of Bottom Water: 1507 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1778	1763	1770
10.0	1760	1774	1767
12.0	1781	1770	1776
15.0	1749	1770	1760
20.0	1710	1710	1710
25.0	1720	1738	1729
30.0	1738	1734	1736
35.0	1734	1720	1727
40.0	1710	1713	1712
47.0	1731	1735	1733



Core Number 5

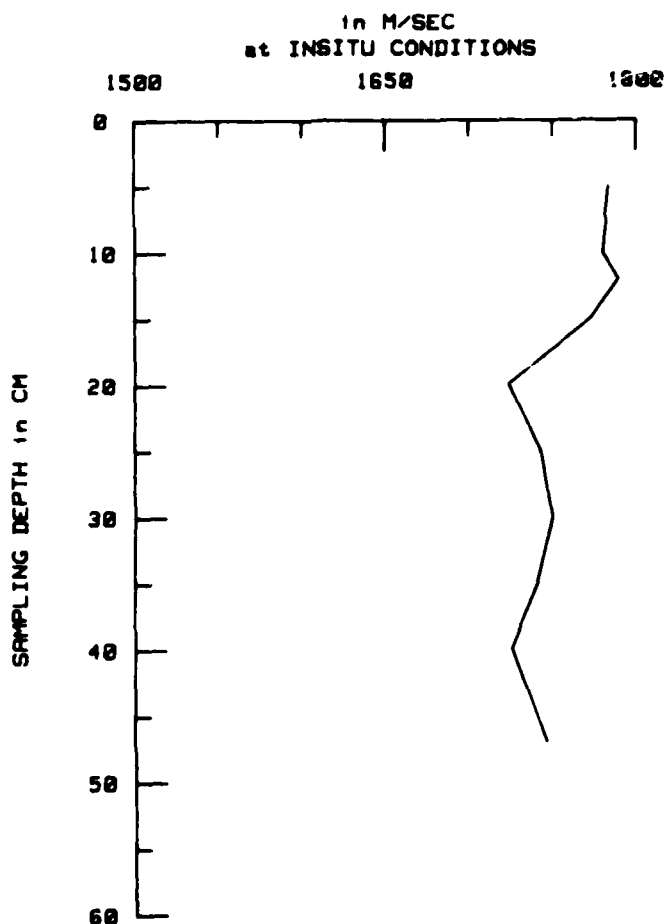
Compressional Wave Velocity, Continued

Lab Item: 5578 Core: 5 (D2)

Cruise Number: BURMMS Latitude : 36 56.6 N Date Analyzed : 3 Aug 81
Ship: CGC Madrona Longitude: 76 1.9 W Date Completed : Aug 81

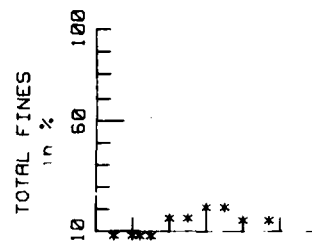
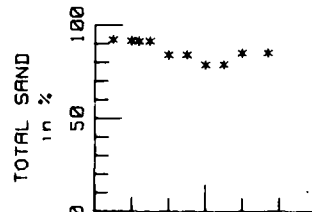
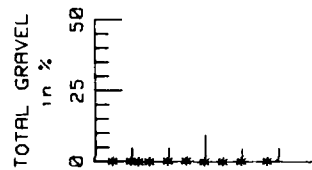
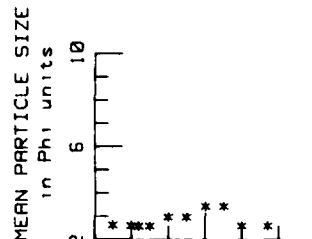
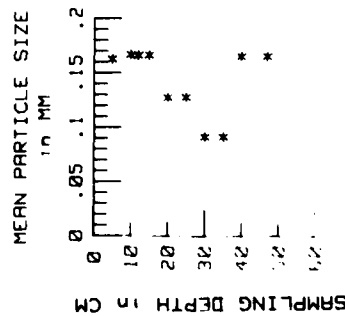
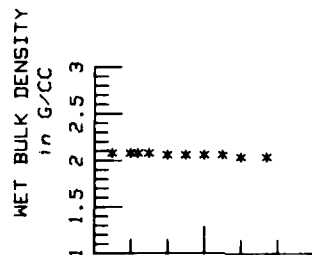
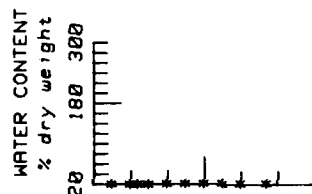
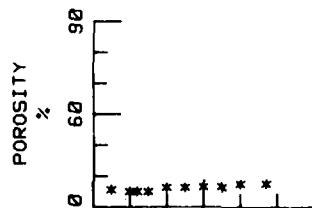
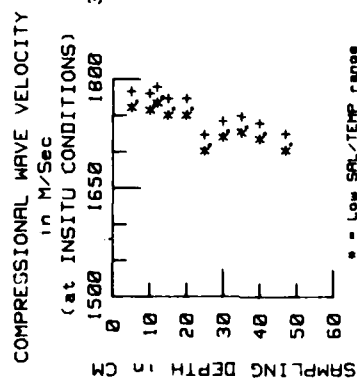
Insitu Salinity: 31.84 ppt Insitu Temperature: 21.83C water Depth: 10.0M
Sound Velocity of Bottom water: 1523 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1791	1776	1783
10.0	1773	1787	1780
12.0	1794	1783	1789
15.0	1762	1783	1773
20.0	1723	1723	1723
25.0	1733	1751	1742
30.0	1751	1747	1749
35.0	1747	1733	1740
40.0	1723	1726	1725
47.0	1744	1748	1746



Core Number 5

SUMMARY of ACOUSTIC AND SEDIMENT MEASUREMENTS for Lab Item: 557 Core: 5 (D2)



Core Number 6

Core Visual Description Sheet

SAMPLE CORE 6
 LATITUDE 36°56.6'N
 CORE LENGTH 36.5 cm
 DATE TAKEN 3 AUG 81
 ANALYST L. M. REYNOLDS

LABORATORY REPORT: 557
 WATER DEPTH: 10 m
 SAMPLER TYPE DIVER (2 1/2")
 DATE: AUGUST 1981

VISUAL OBSERVATIONS	DEPTH (cm.)	CORE SKETCH	COLOR	LAB. NO.	SAMPLE INTERVAL (cm.)	SEDIMENT TYPE (Visual)
0-6.5 cm: Loose sand. A moderate amount of shell fragments. Sharp change in color.	5		5Y4/2	557-29	0 - 6.5	Sand
6.5-18 cm: Homogeneous. A small amount of shell fragments (up to 4 cm long). Gradational change due to appearance of mottling.	10		N2/	557-30	6.5 - 18	
18-36.5 cm: Highly mottled (5GY3/1). A small amount of shell fragments.	20			557-31	18 - 28	
	25					
	30			557-32	28 - 36.5	
	35					
		36.5 cm				

Core Number 6

Bottom Sediment Analysis Summary

Engineering and Mass Physical Properties

LAB ITEM NUMBER: 557 CORE NUMBER: 06

CRUISE NUMBER: RUPNMS LATITUDE: 36 56.6 N MARSDEN SQUARE: 116 CORE TYPE: DATE CORE TAKEN: 3AUG81
SHIP NAME: LONGITUDE: 76 2.0 W WATER DEPTH: 10.0 M CORE LENGTH: 36.5 CM DATE ANALYZED: APR82

SAMPLING INTERVAL (CM) FROM: 0 6.5 18.0 28.0
TO: 6.5 18.0 28.0 36.5

WET UNIT WEIGHT (GFAMS/CCM): 2.07 2.07 2.06 1.97
SPECIFIC GRAVITY OF SOLIDS: 2.67 2.67 2.67 2.67
WATER CONTENT (XDY WEIGHT): 21.0 20.2 21.5 27.0
VOID RATIO: .561 .539 .574 .721
SATURATED VOID RATIO: .561 .539 .574 .721
POROSITY (%): 35.93 35.04 36.47 41.89

REMARKS:

*CALCULATED, ASSUMING 100% SATURATION, FROM THE RELATIONSHIP:
WET UNIT WEIGHT = SP. GRV * (1 + (WATER / 100)) / (1 + (WATER / 100) + (WATER / 100))

Sediment Size and Composition Data

CRUISE RUPNMS SAMPLE 06	TAKEN SAUG81 DEPTH 10.0	LATITUDE 36 56.6 N LONGITUDE 76 2.0 W	MARSDEN SQUARE 116 COKER TYPE	LENGTH PENETRATION 36.5	ANALYZED APR82
SUMSAMPLE TO: DEPTH INTERVAL	557 20 6.5-18.0	557 30 6.5-18.0	557 31 18.0-28.0	557 32 28.0-36.5	
DIAM (MM)	DIAM (MM)	PERCENT	PERCENT	PERCENT	PERCENT
< 4	> 16	.000	.000	.000	.000
4 TO 8	16.000 TO 8.000	.000	.258	.000	1.452
8 TO 16	8.000 TO 4.000	.000	.000	.393	.443
16 TO 32	4.000 TO 2.000	.022	.010	.000	.071
32 TO 63	2.000 TO 1.000	.160	.447	.828	.779
63 TO 125	1.000 TO .500	.312	6.337	10.166	9.952
125 TO 250	.500 TO .250	33.488	35.706	41.656	38.959
250 TO 500	.250 TO .125	75.472	21.073	18.075	17.284
500 TO 1000	.125 TO .063	18.477	20.747	11.346	11.865
1000 TO 2000	.063 TO .031	1.147	4.702	2.043	3.419
2000 TO 4000	.031 TO .016	.478	2.130	1.946	2.036
4000 TO 8000	.016 TO .008	.048	.275	1.139	1.324
8000 TO 16000	.008 TO .004	.167	.670	1.097	1.186
16000 TO 32000	.004 TO .002	.143	.704	.870	.903
32000 TO 64000	.002 TO .001	.167	.618	.745	.832
> 64	< .001	7.219	7.024	8.696	9.497
GRAVEL (2.0-6.3 MM)		.022	.268	.393	1.966
SAND (0.6-2.0 MM)		50.409	84.709	42.070	78.838
SILT (0.075-0.6 MM)		1.141	7.076	7.226	7.969
CLAY (< 0.075 MM)		7.529	4.347	10.311	11.227
MEAN (MM)		.1717	.1224	.1277	.1243
MEAN (PMT)		2.929	3.730	2.969	3.004
STANDARD DEVIATION		2.316	7.507	2.808	3.000
SKINNESS		1.242	.952	.876	.698
SKINNESS		5.527	3.323	2.133	1.535
COLOR (GSA)		5.4/2	4.2/	4.7/	4.2/

Core Number 6

Compressional Wave Velocity

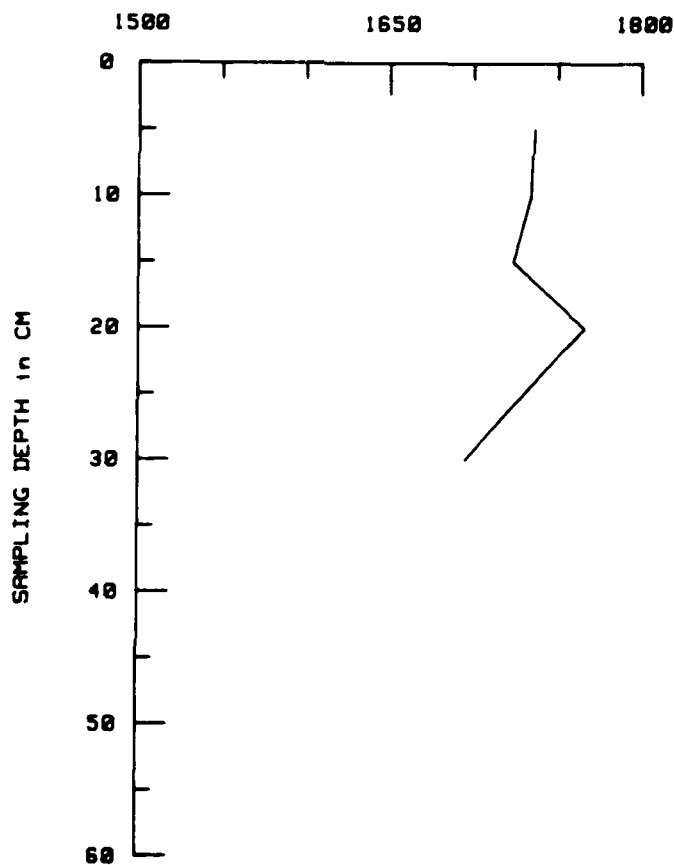
Lab Item: 557 Core: 6 (D6)

Cruise Number: BURMMS Latitude : 36 56.6 N Date Analyzed : 3 Aug 61
Ship: CGC Madrona Longitude: 76 2.0 W Date Completed : Aug 61

Insitu Salinity: 24.63 ppt Insitu Temperature: 14.55C Water Depth: 10.0M
Sound Velocity of Bottom water: 1493 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1727	1745	1736
10.0	1734	1734	1734
15.0	1724	1724	1724
20.0	1773	1759	1766
25.0	1730	1730	1730
30.0	1689	1702	1695

in M/SEC
at INSITU CONDITIONS



Core Number 6

Compressional Wave Velocity, Continued

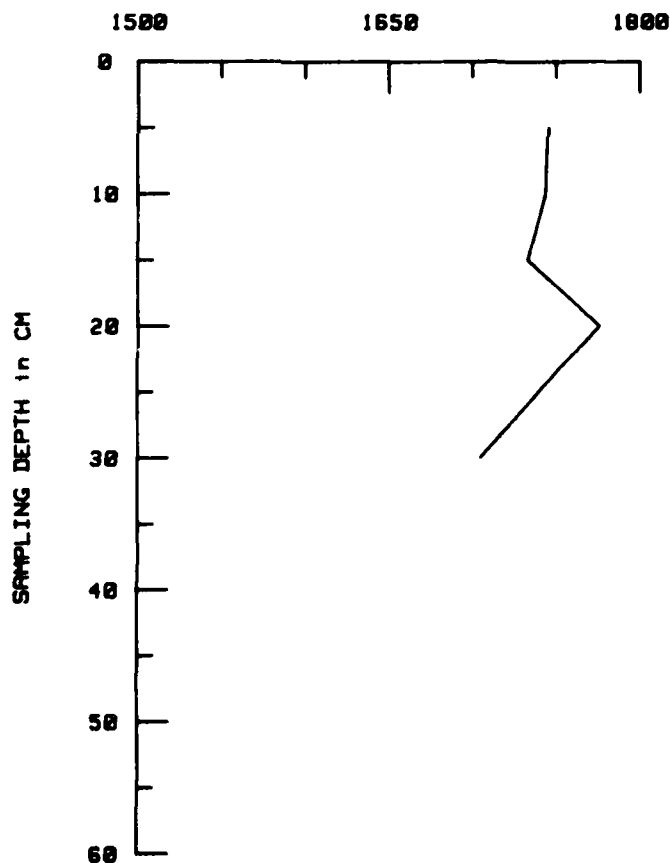
Lab Item: 557 Core: 6 (D6)

Cruise Number: BURMMS Latitude : 36 56.6 N Date Analyzed : 3 Aug 81
Ship: CGC Madrona Longitude: 76 2.0 W Date Completed : Aug 81

Insitu Salinity: 28.84 ppt Insitu Temperature: 17.31C Water Depth: 10.0M
Sound Velocity of Bottom Water: 1507 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1736	1754	1745
10.0	1744	1744	1744
15.0	1733	1733	1733
20.0	1783	1768	1776
25.0	1739	1739	1739
30.0	1698	1711	1705

in M/SEC
at INSITU CONDITIONS



Core Number 6

Compressional Wave Velocity, Continued

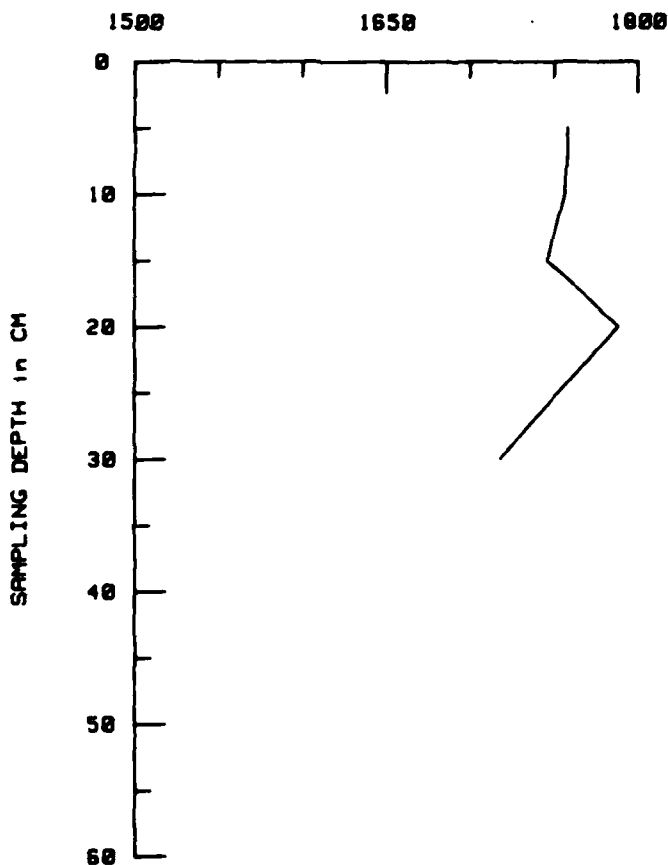
Lab Item: 557 Core: 6 (D6)

Cruise Number: BURMMS Latitude : 36 56.6 N Date Analyzed : 3 Aug 81
Ship: CGC Madrona Longitude: 76 2.0 W Date Completed : Aug 81

Insitu Salinity: 31.84 ppt Insitu Temperature: 21.83C Water Depth: 10.0M
Sound Velocity of Bottom Water: 1523 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1749	1767	1758
10.0	1757	1757	1757
15.0	1746	1746	1746
20.0	1796	1781	1789
25.0	1753	1753	1753
30.0	1711	1724	1718

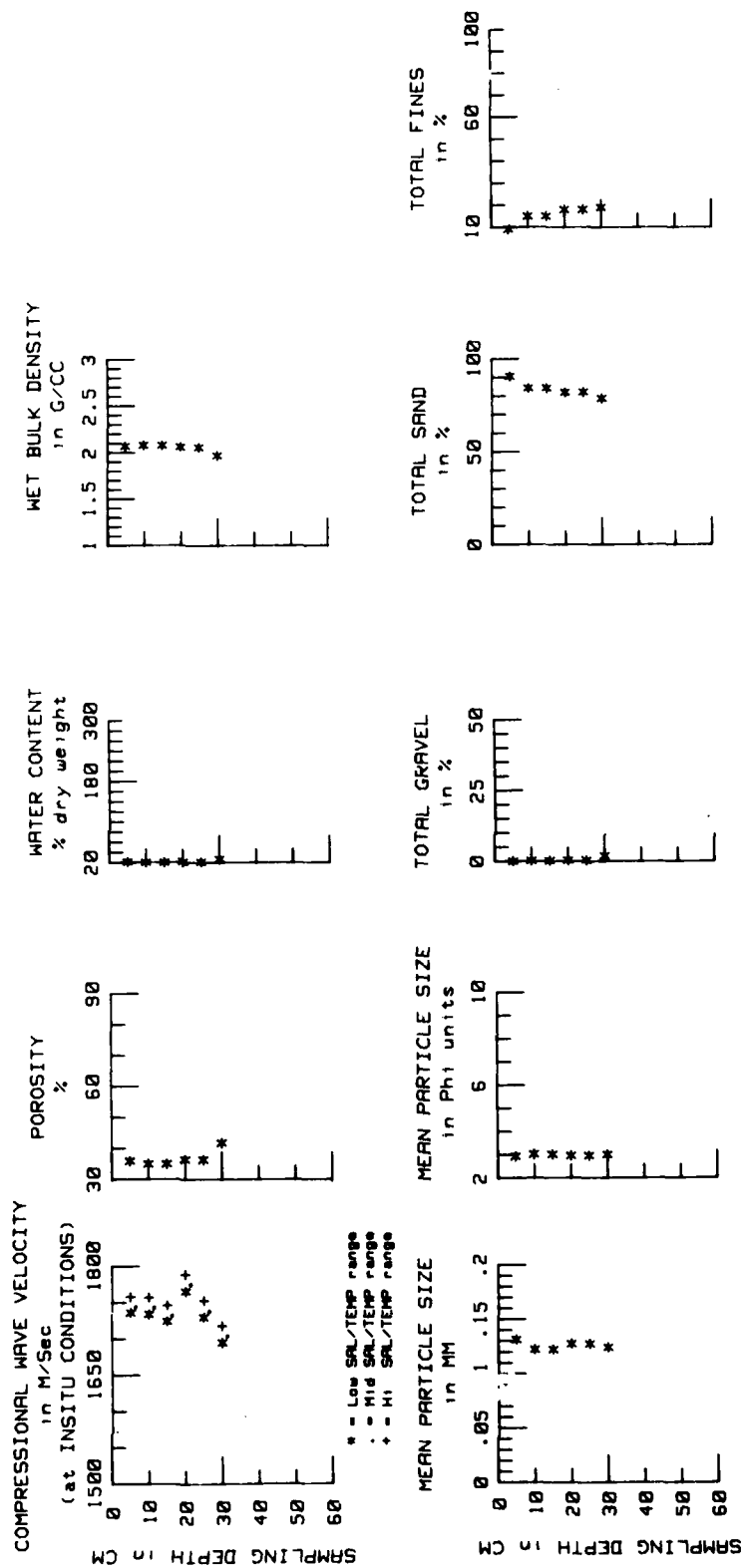
in M/SEC
at INSITU CONDITIONS



Core Number 6

SUMMARY of ACOUSTIC AND SEDIMENT MEASUREMENTS for

Lab Item: 557 Core: 6 (D6)



Core Number 7

Core Visual Description Sheet

SAMPLE: CORE 7
 LATITUDE: 36°36.6'N
 CORE LENGTH: 25 cm
 DATE TAKEN: 3 AUG 81

LONGITUDE: 76°02.1'W
 CORE PENETRATION: UNKNOWN
 ANALYST: L. H. REYNOLDS

LABORATORY REPORT 557
 WATER DEPTH 10 m
 SAMPLER TYPE DIVER (2 1/2")
 DATE: AUGUST 1981

VISUAL OBSERVATIONS		DEPTH (cm.)	CORE SKETCH	COLOR	LAB. NO.	SAMPLE INTERVAL (cm.)	SEDIMENT TYPE (Visual)
0-18 cm: Moderately mottled (5GY3/1). Several .5-8 cm thickness slightly inclined lenses of fine sand in a medium to coarse sand matrix. A small amount of shell fragments. Gradational change in color and texture.		5		5Y4/3	557-33	0 - 8	Sand
		10					
		15					
		20					
		25					
18-25 cm: Lightly mottled (5Y3/2). A small amount of shell fragments.		18		N3/	557-34	18-25	Silty Sand
		19					
		20					
		21					
		22					
		23					
		24					
		25					

Core Number 7

Bottom Sediment Analysis Summary

Engineering and Mass Physical Properties

LAB ITEM NUMBER: 557 CORE NUMBER: 05

CRUISE NUMBER: RUFHMS LATITUDE : 36 56.6 N MARSDEN SQUARE: 116 CORER TYPE : DATE CORE TAKEN: 3AUG81
SHIP NAME: LONGITUDE: 76 2.1 W WATER DEPTH : 10.0 M CORE LENGTH: 25.0 CM DATE ANALYZED : APR82

SAMPLING INTERVAL (CM) FROM: 0 9.0 19.0
TO : 8.0 18.0 25.0

NET UNIT WEIGHT (GFANS/CCM): 2.05 2.11 2.07
SPECIFIC GRAVITY OF SOLIDS : 2.67 2.67 2.67
WATER CONTENT (XDRY WEIGHT): 22.0 19.1 21.2
VOID RATIO : .587 .510 .566
SATURATED VOID RATIO : .587 .510 .566
POROSITY (%) : 37.00 33.77 36.14

REMARKS:

*CALCULATED, ASSUMING 100% SATURATION, FROM THE RELATIONSHIP:
NET UNIT WEIGHT = SP. GRV * (1 + (WATER / 100)) / 1 + (SP. GRV + (WATER / 100))

Sediment Size and Composition Data

CRUISE RUFHMS SAMPLE #5	TAKEN 3AUG81 DEPTH 10.0	LATITUDE 36 56.60 N LONGITUDE 76 2.10 W	MARSDEN SQUARE 116 CORER TYPE	LENGTH 25.0 PENETRATION	ANALYZED APR82
SUBSAMPLE ID: DEPTH INTERVAL		557 35 0-8.0	557 36 9.0-18.0	557 35 19.0-25.0	
DIAM (PHI)	DIAM (MM)	PERCENT	PERCENT	PERCENT	
<-4	>16.000	.000	.000	.000	
-4 TO -3	16.000 TO 8.000	.000	.000	.000	
-3 TO -2	8.000 TO 4.000	.000	.073	.268	
-2 TO -1	4.000 TO 2.000	.025	.182	.582	
-1 TO 0	2.000 TO 1.000	.125	.474	.761	
0 TO 1	1.000 TO .500	5.692	9.031	7.002	
1 TO 2	.500 TO .250	58.074	49.089	45.681	
2 TO 3	.250 TO .125	23.947	16.619	19.821	
3 TO 4	.125 TO .063	6.419	2.364	9.374	
4 TO 5	.063 TO .031	5.717	1.786	2.729	
5 TO 6	.031 TO .016	.000	.984	.828	
6 TO 7	.016 TO .008	.000	.636	.872	
7 TO 8	.008 TO .004	.000	.567	.621	
8 TO 9	.004 TO .002	.000	.547	.694	
9 TO 10	.002 TO .001	.000	.510	.649	
>10	<.001	.000	10.241	10.265	
GRAVEL (>2.0 MM)		.025	.255	.850	
SAND (2.0-.063 MM)		96.238	84.675	82.438	
SILT (.063-.004 MM)		5.717	1.972	5.101	
CLAY (<.004 MM)		.000	11.297	11.611	
MEAN (MM)		.2536	.1363	.1254	
MEAN (PHI)		1.979	2.976	2.996	
STANDARD DEVIATION		.919	2.985	2.905	
SKEWNESS		.577	.056	.889	
KURTOSIS		1.277	2.376	2.039	
COLOR (GSA)		5Y4/3	5Y4/3	N3/	

Core Number 7

Compressional Wave Velocity

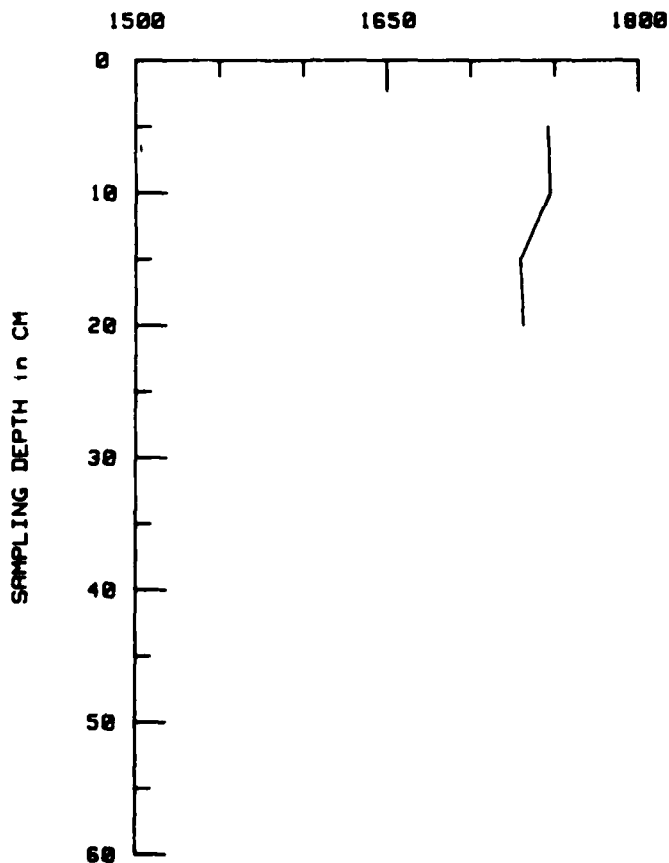
Lab Item: 557 Core: 7 (D5)

Cruise Number: BURMMS Latitude : 36 56.6 N Date Analyzed : 3 Aug 61
Ship: CGC Madrona Longitude: 76 2.1 W Date Completed : Aug 61

Insitu Salinity: 24.63 ppt Insitu Temperature: 14.55C water Depth: 10.0M
Sound Velocity of Bottom Water: 1493 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1752	1741	1746
10.0	1747	1747	1747
15.0	1723	1737	1730
20.0	1737	1726	1731

in M/SEC
at INSITU CONDITIONS



Core Number 7

Compressional Wave Velocity, Continued

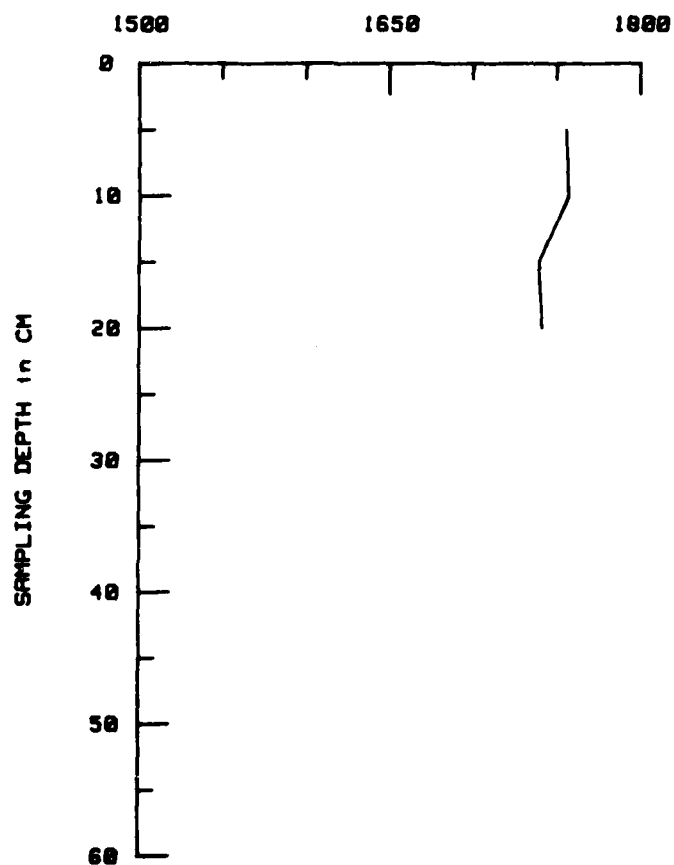
Lab Item: 557 Core: 7 (D5)

Cruise Number: BURMMS Latitude : 36 56.6 N Date Analyzed : 3 Aug 81
Ship: CGC Madrona Longitude: 76 2.1 W Date Completed : Aug 81

Insitu Salinity: 28.84 ppt Insitu Temperature: 17.31C Water Depth: 10.0M
Sound Velocity of Bottom Water: 1507 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1761	1750	1756
10.0	1757	1757	1757
15.0	1732	1746	1739
20.0	1746	1736	1741

in M/SEC
at INSITU CONDITIONS



Core Number 7

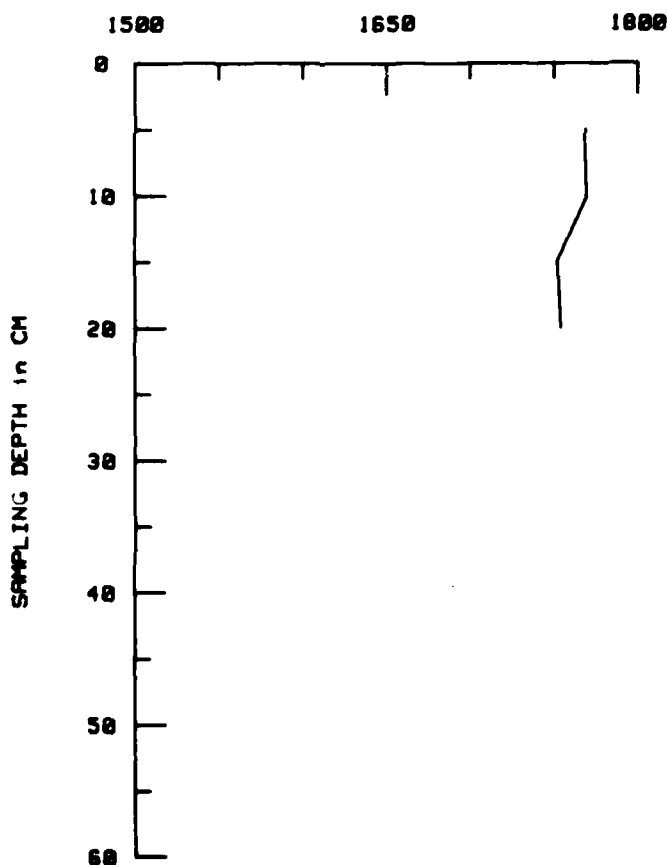
Compressional Wave Velocity, Continued

Lab Item: 557 Core: 7 (D5)

Cruise Number: BURMMS Latitude: 36 56.6 N Date Analyzed: 3 Aug 81
 Ship: CGC Madrona Longitude: 76 2.1 W Date Completed: Aug 81
 Insitu Salinity: 31.84 ppt Insitu Temperature: 21.83C Water Depth: 10.0M
 Sound Velocity of Bottom Water: 1523 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1774	1763	1769
10.0	1770	1770	1770
15.0	1745	1759	1752
20.0	1759	1749	1754

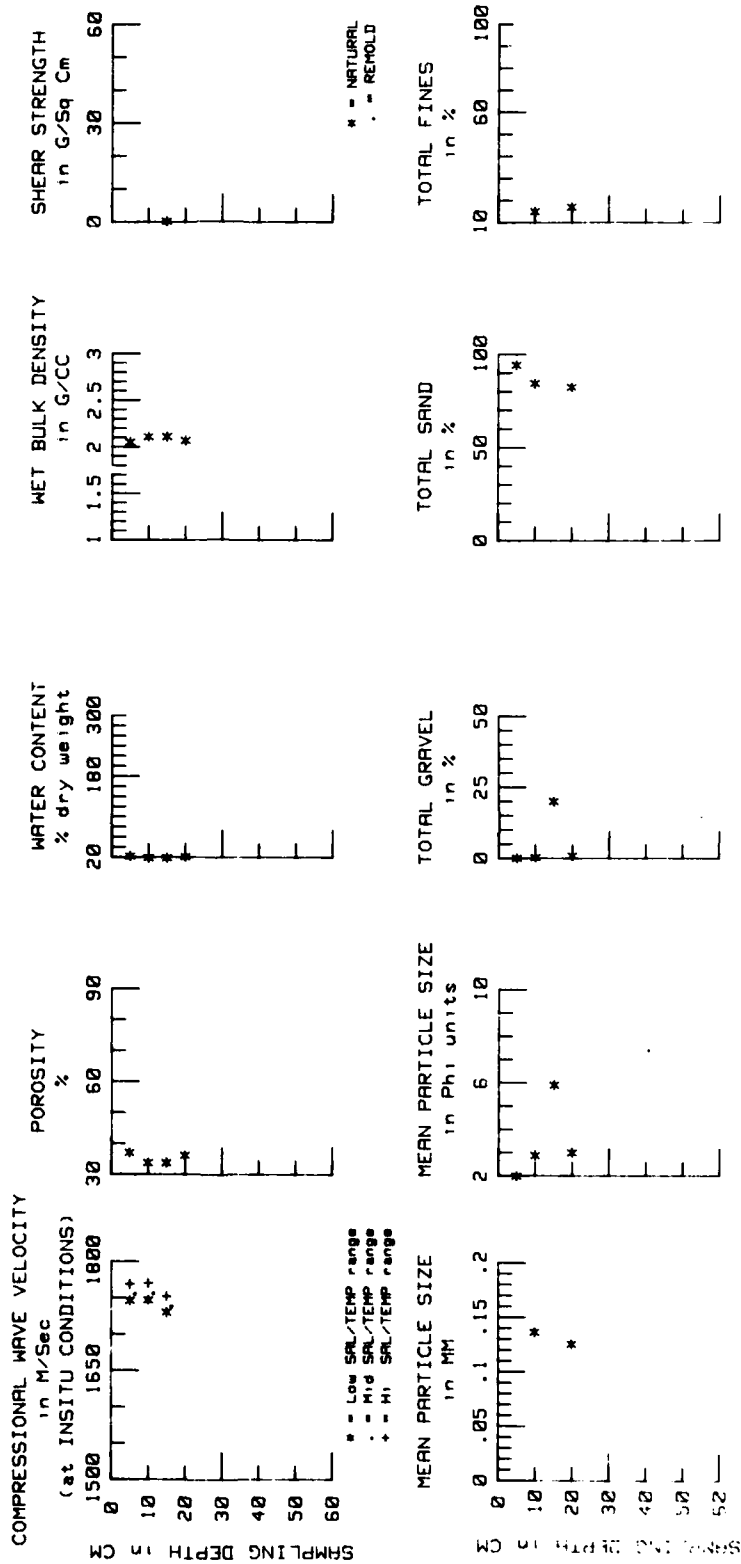
in M/SEC
at INSITU CONDITIONS



Core Number 7

SUMMARY of ACOUSTIC AND SEDIMENT MEASUREMENTS for

Lab Item: 557 Core: 7 (D5)



Core Number 8

Core Visual Description Sheet

SAMPLE CORE 8
 LATITUDE 36°59.3'N
 CORE LENGTH 44 cm
 DATE TAKEN 4 AUG 81

LABORATORY REPORT 557
 WATER DEPTH 15 m
 SAMPLER TYPE DIVER (2 1/2")
 DATE AUGUST 1981

LONGITUDE 75°45.1'W
 CORE PENETRATION UNKNOWN
 ANALYST L. M. REYNOLDS

VISUAL OBSERVATIONS		DEPTH (cm.)	CORE SKETCH	COLOR	LAB. NO.	SAMPLE INTERVAL (cm.)	SEDIMENT TYPE (Visual)
0-30 cm: Homogenous. Distinct change in texture.		5		SGY4/1	557-36	9 - 10	Sand
		10			557-37	10 - 20	
		15					
		20			557-38	20 - 30	
		25					
		30			557-39	30 - 38	Gravelly Sand
		35					
		40			557-40	38 - 44	
		44					
30-44 cm: A moderate amount of whale shells and shell fragments.		5		SGY4/1	557-36	9 - 10	Sand
		10			557-37	10 - 20	
		15					
		20			557-38	20 - 30	
		25					
		30			557-39	30 - 38	Gravelly Sand
		35					
		40			557-40	38 - 44	
		44					

Core Number 8

Bottom Sediment Analysis Summary

Engineering and Mass Physical Properties

LAB ITEM NUMBER: 557 CORE NUMBER: 81

CRUISE NUMBER: RUMMS LATITUDE: 36 59.3 N MARSDEN SQUARE: 116 CORE TYPE: DATE CORE TAKEN: 4AUG81
SHIP NAME: LONGITUDE: 75 45.1 W WATER DEPTH: 15.0 M CORE LENGTH: 44.0 CM DATE ANALYZED: APR82

SAMPLING INTERVAL (CM) FROM: TO: 0 10.0 10.0 20.0 20.0 30.0 30.0 38.0 38.0 44.0

WET UNIT WEIGHT (G/CM³): 2.00 2.03 2.00 1.99 1.99
SPECIFIC GRAVITY OF SOLIDS: 2.67 2.67 2.67 2.67 2.67
WATER CONTENT (DRY WEIGHT): 25.0 23.0 25.1 25.9 25.5
VOID RATIO: .668 .614 .670 .692 .681
SATURATED VOID RATIO: .667 .614 .670 .692 .681
POROSITY (%): 40.0 38.0 40.1 40.8 40.5

REMARKS:

*CALCULATED, ASSUMING 100% SATURATION, FROM THE RELATIONSHIP:
WET UNIT WEIGHT = SP. GRV * (1 + (WATER / 100)) / 1 + (SP. GRV + (WATER / 100))

Sediment Size and Composition Data

CRUISE RUMMS SAMPLE #1	TAKEN NAUG81 DEPTH 15.0	LATITUDE 36 59.3 N	MARSDEN SQUARE 116	LENGTH PENETRATION	ANALYZED APR82
	SUBSAMPLE ID: DEPTH INTERVAL	557 36 0-10.0	557 37 10.0-20.0	557 38 20.0-30.0	557 40 30.0-44.0
DIAM (PHI)	DIAM (MM)	PERCENT	PERCENT	PERCENT	PERCENT
< 4	> 16.00	.000	.000	.000	.000
4 TO 5	16.00 TO 8.000	.000	.000	.000	.000
5 TO 6	8.000 TO 4.000	.000	.000	.000	.000
6 TO 7	4.000 TO 2.000	.000	.000	.000	.000
7 TO 8	2.000 TO 1.000	.000	.000	.000	.000
8 TO 9	1.000 TO .500	.000	.000	.000	.000
9 TO 10	.500 TO .250	.000	.000	.000	.000
10 TO 11	.250 TO .125	.000	.000	.000	.000
11 TO 12	.125 TO .063	.000	.000	.000	.000
12 TO 13	.063 TO .031	.000	.000	.000	.000
13 TO 14	.031 TO .016	.000	.000	.000	.000
14 TO 15	.016 TO .008	.000	.000	.000	.000
15 TO 16	.008 TO .004	.000	.000	.000	.000
16 TO 17	.004 TO .002	.000	.000	.000	.000
17 TO 18	.002 TO .001	.000	.000	.000	.000
18 TO 19	.001	.000	.000	.000	.000
GRAVEL (2.0-6.3 MM)		.000	.000	.000	.000
SAND (0.063-2.0 MM)		.000	.000	.000	.000
SILT (0.004-0.063 MM)		.000	.000	.000	.000
CLAY (< 0.004 MM)		.000	.000	.000	.000
MEAN (PHI)		.000	.000	.000	.000
MEAN (PMT)		.000	.000	.000	.000
STANDARD DEVIATION		.000	.000	.000	.000
SKINNESS		.000	.000	.000	.000
PLASTICITY		.000	.000	.000	.000
COLOR (USA)		.000	.000	.000	.000

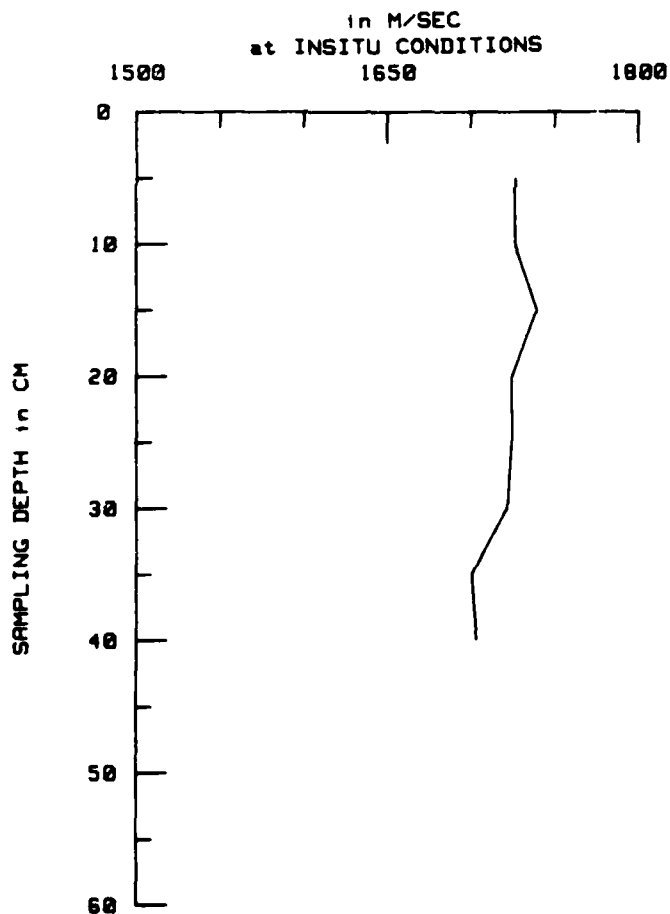
Core Number 8

Compressional Wave Velocity

Lab Item: 557 Core: 8 (B1)

Cruise Number: BURMMS Latitude : 36 59.3 N Date Analyzed : 4 Aug 61
 Ship: CGC Madrona Longitude: 75 45.1 W Date Completed : Aug 61
 Insitu Salinity: 30.75 ppt Insitu Temperature: 11.46C Water Depth: 15.0M
 Sound Velocity of Bottom water: 1490 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1724	1729	1726
10.0	1729	1724	1726
15.0	1739	1739	1739
20.0	1724	1724	1724
25.0	1724	1724	1724
30.0	1721	1721	1721
35.0	1701	1701	1701
40.0	1705	1702	1703



Core Number 8

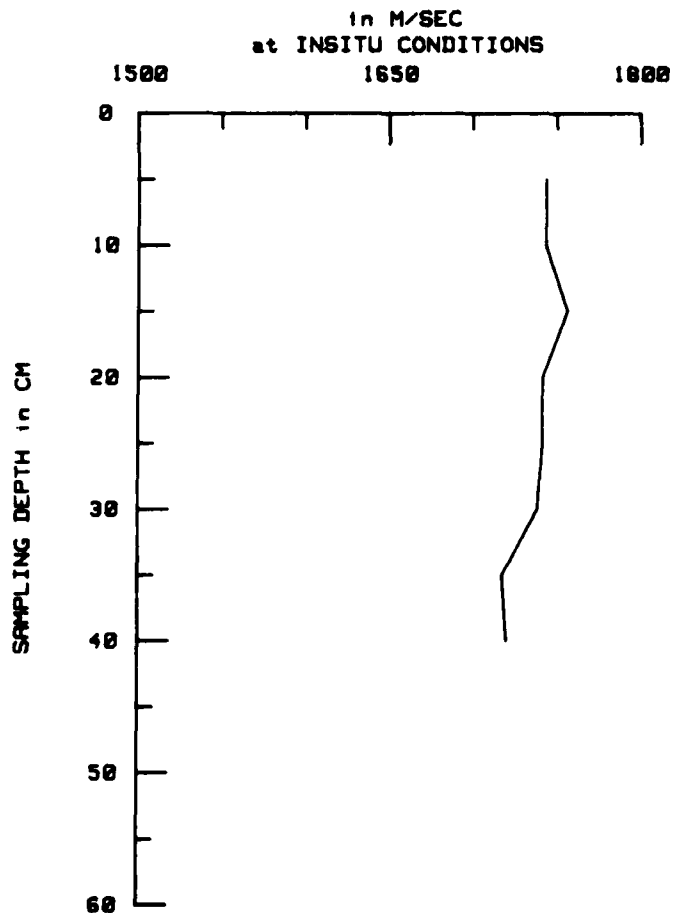
Compressional Wave Velocity, Continued

Lab Item: 557 Core: 8 (B1)

Cruise Number: BURMMS Latitude: 36 59.3 N Date Analyzed: 4 Aug 81
Ship: CGC Madrona Longitude: 75 45.1 W Date Completed: Aug 81

Insitu Salinity: 32.11 ppt Insitu Temperature: 16.54C Water Depth: 15.0M
Sound Velocity of Bottom Water: 1509 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1741	1745	1743
10.0	1745	1741	1743
15.0	1756	1756	1756
20.0	1741	1741	1741
25.0	1741	1741	1741
30.0	1738	1736	1738
35.0	1718	1718	1718
40.0	1722	1719	1720



Core Number 8

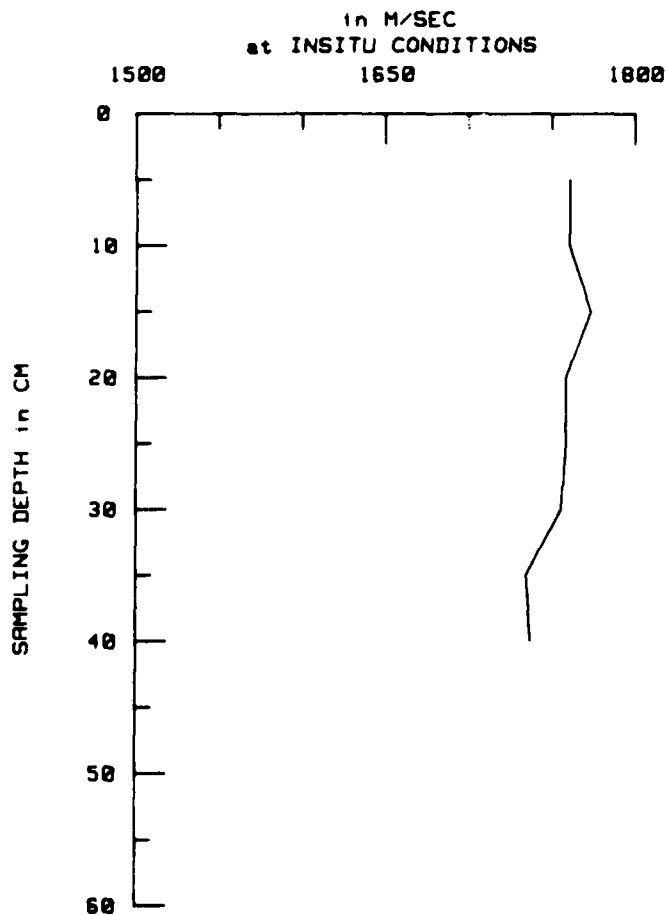
Compressional Wave Velocity, Continued

Lab Item: 557 Core: 6 (B1)

Cruise Number: BURMMS Latitude : 36 59.3 N Date Analyzed : 4 Aug 81
Ship: CGC Madrona Longitude: 75 45.1 W Date Completed : Aug 81

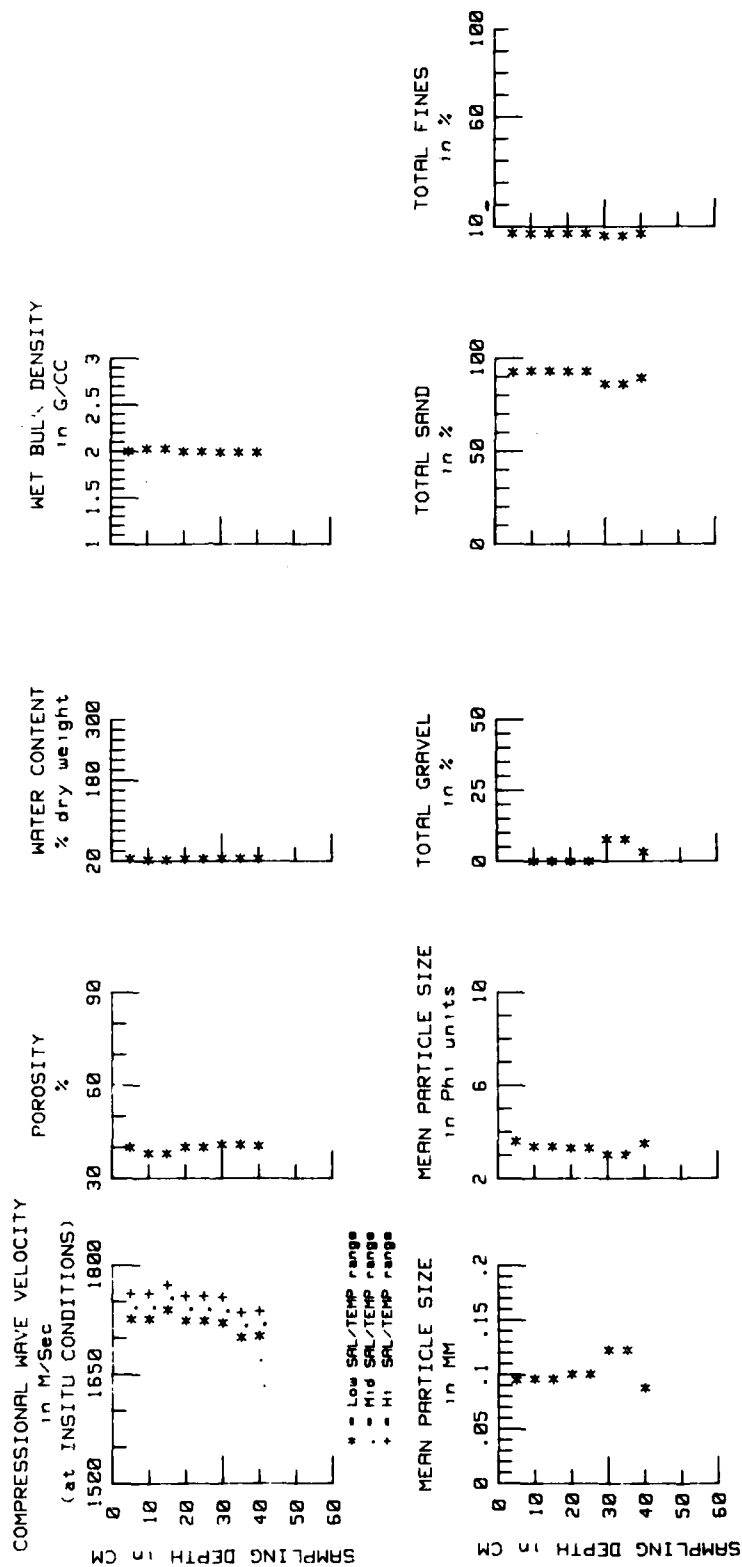
Insitu Salinity: 33.59 ppt Insitu Temperature: 22.64C Water Depth: 15.0M
Sound Velocity of Bottom water: 1528 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1758	1763	1761
10.0	1763	1758	1761
15.0	1773	1773	1773
20.0	1756	1758	1758
25.0	1756	1758	1758
30.0	1756	1756	1756
35.0	1735	1735	1735
40.0	1739	1736	1737



Core Number 8

SUMMARY of ACOUSTIC AND SEDIMENT MEASUREMENTS for Lab Item: 557 Core: 8 (B)



Core Number 9

Core Visual Description Sheet

SAMPLE: CORE 9
 LATITUDE: 36°59.3'N
 CORE LENGTH: 35 cm
 DATE TAKEN: 4 AUG 81

LONGITUDE: 75°45.0'W
 CORE PENETRATION: UNKNOWN
 ANALYST: L. M. REYNOLDS

LABORATORY REPORT 557
 WATER DEPTH: 15 m
 SAMPLER TYPE: DIVER (2 1/2")
 DATE: AUGUST 1981

VISUAL OBSERVATIONS	DEPTH (cm.)	CORE SKETCH	COLOR	LAB. NO.	SAMPLE INTERVAL (cm.)	SEDIMENT TYPE (Visual)
0-10 cm: Moderately mottled (5Y4/1). A very small amount of shell fragments. Gradational change in mottling.	5		NA/	557-41	0 - 10	Sand
10-35 cm: Lightly mottled (5Y4/1). A small amount of shell fragments.	10			557-42	10 - 20	
	20			557-43	20 - 28	
	30			557-44	28 - 35	
	35	35 cm				

Core Number 9

Bottom Sediment Analysis Summary

Engineering and Mass Physical Properties

LAR ITEM NUMBER: 557 CORE NUMBER:02

CRUISE NUMBER: BURNMS LATITUDE: 36 59.3 N HARDSEN SQUARE: 116 CORE TYPE: DATE CORE TAKEN: 4AUG81
SHIP NAME: LONGITUDE: 75 45.0 W WATER DEPTH: 15.0 M CORE LENGTH: 35.0 CM DATE ANALYZED: APR82

SAMPLING INTERVAL (CM) FROM: 0 10.0 20.0 28.0
TO: 10.0 20.0 28.0 35.0

WET UNIT WEIGHT (GRAMS/CCM): 2.01 1.99 2.00 2.00
SPECIFIC GRAVITY OF SOLIDS: 2.67 2.67 2.67 2.67
WATER CONTENT (% DRY WEIGHT): 24.2 25.6 25.2 25.0
VOID RATIO: .646 .684 .673 .668
SATURATED VOID RATIO: .646 .684 .673 .667
POROSITY(%): 39.25 40.60 40.22 40.03

REMARKS:

*CALCULATED, ASSUMING 100% SATURATION, FROM THE RELATIONSHIP:
WET UNIT WEIGHT = SP. GRV * (1 + (%MOISTURE / 100)) / (1 + (SP. GRV + (%MOISTURE / 100)))

Sediment Size and Composition Data

CRUISE BURNMS SAMPLE 02	TAKEN 4AUG81 DEPTH 16.0	LATITUDE 36 59.30 N LONGITUDE 75 45.00 W	HARDSEN SQUARE 116 CORE TYPE	LENGTH PENETRATION 35.0	ANALYZED APR82
	SUBSAMPLING DEPTH INTERVAL	0-10.0	10.0-20.0	20.0-28.0	28.0-35.0
	DIAM (PHI)	DIAM (MM)	PERCENT	PERCENT	PERCENT
	<-4	>16.000	.000	.000	.000
	-4 TO -3	16.000 TO 8.000	.000	.000	.000
	-3 TO -2	8.000 TO 4.000	.000	.396	.075
	-2 TO -1	4.000 TO 2.000	.007	.062	.275
	-1 TO 0	2.000 TO 1.000	.067	.146	.125
	0 TO 1	1.000 TO .500	.152	.250	.100
	1 TO 2	.500 TO .250	.523	.896	.150
	2 TO 3	.250 TO .125	21.000	29.577	49.446
	3 TO 4	.125 TO .063	71.814	62.820	73.839
	4 TO 5	.063 TO .031	2.019	1.729	2.571
	5 TO 6	.031 TO .016	.214	.167	.349
	6 TO 7	.016 TO .008	.000	.003	.050
	7 TO 8	.008 TO .004	.119	.042	.175
	8 TO 9	.004 TO .002	.000	.104	.075
	9 TO 10	.002 TO .001	.004	.104	.125
	>10	<.001	4.038	3.624	2.646
	GRAVEL (2.0-6.3 MM)		.007	.468	.349
	SAND (2.0-.063 MM)		93.555	93.689	93.660
	SILT (.063-.004 MM)		2.352	2.020	3.146
	CLAY (<.004 MM)		4.096	3.833	2.846
	MEAN (MM)		.0832	.0924	.0875
	MEAN (PHI)		3.587	3.436	3.514
	STANDARD DEVIATION		1.514	1.552	1.326
	SKEWNESS		1.000	1.507	1.073
	KURTOSIS		14.858	14.016	19.348
	COLOR (ASA)		N4/	N4/	N4/

Core Number 9

Compressional Wave Velocity

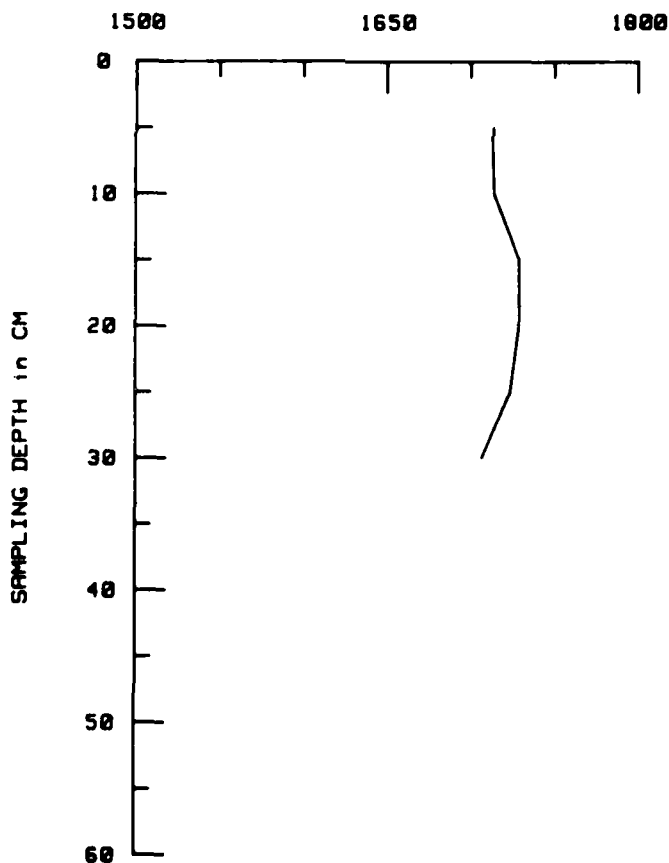
Lab Item: 227 Core: 9 (B2)

Cruise Number: BURMMS Latitude : 36 59.3 N Date Analyzed : 4 Aug 81
Ship: CGC Madrona Longitude: 75 45.0 W Date Completed : Aug 81

Insitu Salinity: 30.75 ppt Insitu Temperature: 11.46C Water Depth: 15.0M
Sound Velocity of Bottom Water: 1490 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1719	1708	1713
10.0	1715	1713	1714
15.0	1729	1729	1729
20.0	1729	1729	1729
25.0	1729	1719	1724
30.0	1708	1706	1707

in M/SEC
at INSITU CONDITIONS



Core Number 9

Compressional Wave Velocity, Continued

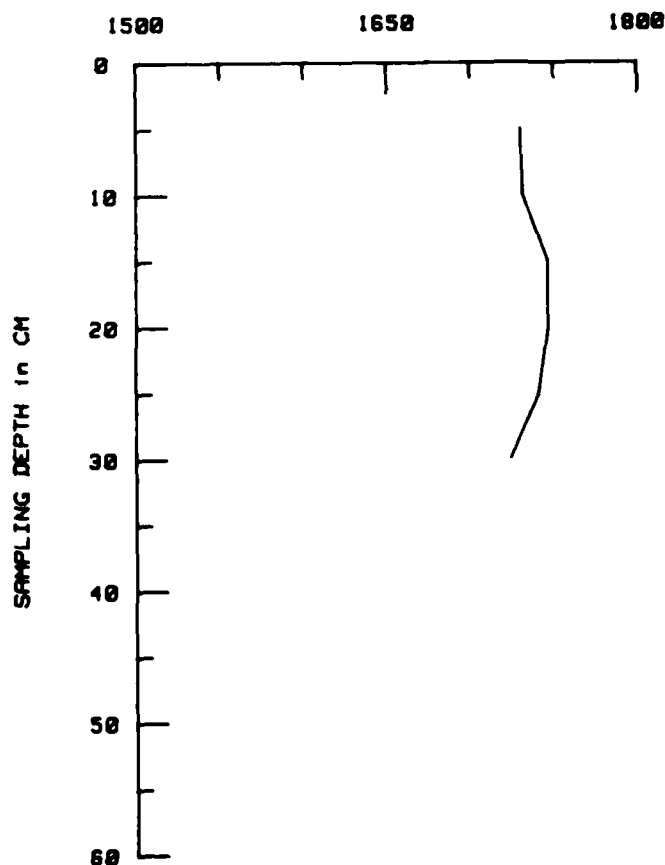
Lab Item: 557 Core: 9 (B2)

Cruise Number: BURMMS Latitude: 36 59.3 N Date Analyzed: 4 Aug 81
Ship: CGC Madrona Longitude: 75 45.0 W Date Completed: Aug 81

Insitu Salinity: 32.11 ppt Insitu Temperature: 16.54C Water Depth: 15.0M
Sound Velocity of Bottom Water: 1509 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1736	1725	1730
10.0	1732	1730	1731
15.0	1746	1746	1746
20.0	1746	1746	1746
25.0	1746	1736	1741
30.0	1725	1723	1724

in M/SEC
at INSITU CONDITIONS



Core Number 9

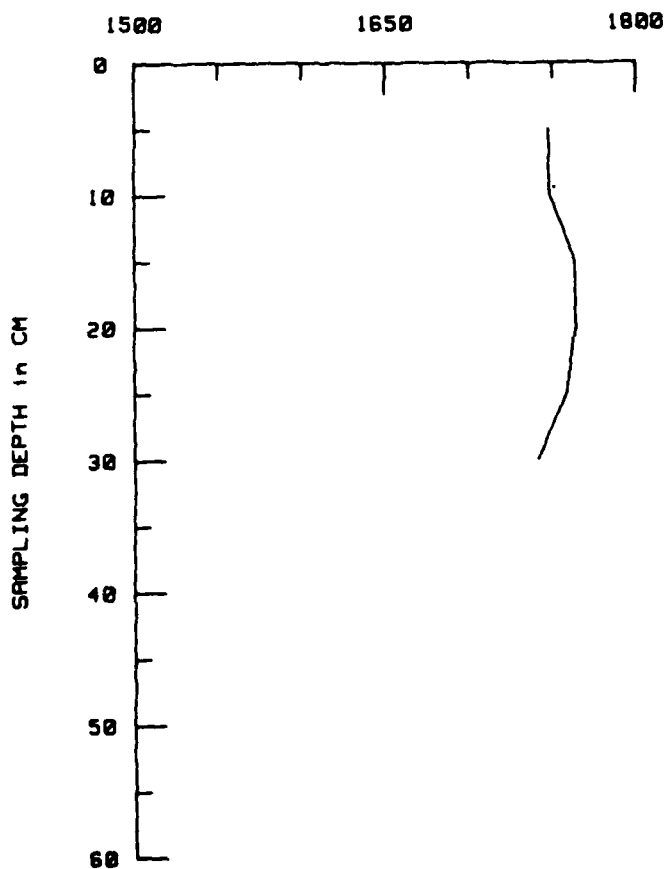
Compressional Wave Velocity, Continued

Lab Item: 557 Core: 9 (B2)

Cruise Number: BURMMS Latitude : 36 59.3 N Date Analyzed : 4 Aug 81
 Ship: CGC Madrona Longitude: 75 45.0 W Date Completed : Aug 81
 Insitu Salinity: 33.59 ppt Insitu Temperature: 22.64C Water Depth: 15.0M
 Sound Velocity of Bottom Water: 1528 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1753	1742	1748
10.0	1750	1748	1749
15.0	1763	1763	1763
20.0	1763	1763	1763
25.0	1763	1753	1758
30.0	1742	1740	1741

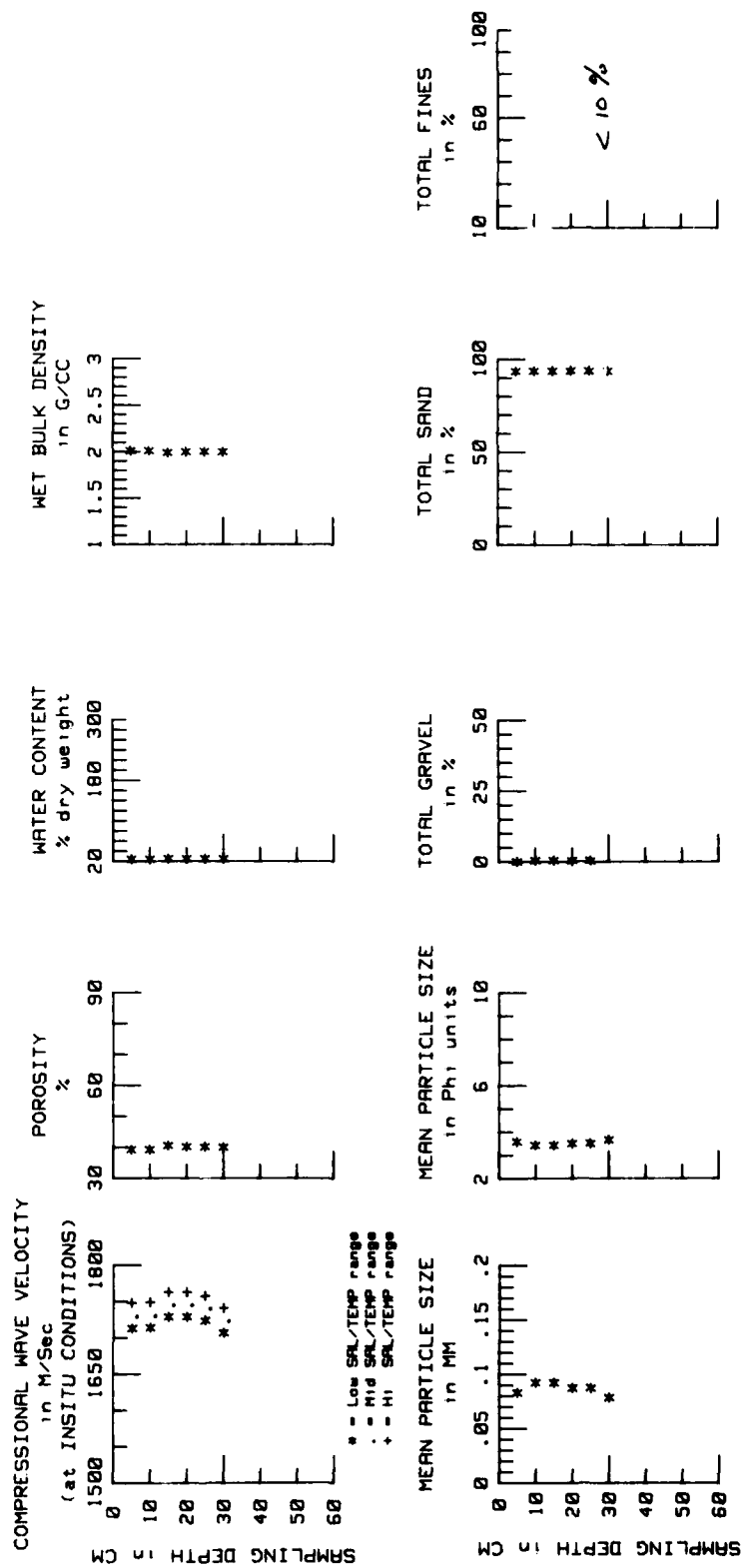
in M/SEC
at INSITU CONDITIONS



Core Number 9

SUMMARY of ACOUSTIC AND SEDIMENT MEASUREMENTS for

Lab Item: 557 Core: 9 (B2)



Core Visual Description Sheet

LABORATORY REPORT 557
WATER DEPTH 23 m
SAMPLER TYPE DIVER (2 1/2")
DATE AUGUST 1981

0-42 cm: Homogenous sand top to bottom with some light mottling throughout the core.

Core Number 10

Bottom Sediment Analysis Summary

Engineering and Mass Physical Properties

LAB ITEM NUMBER: 557 CORE NUMBER: C1-2

CRUISE NUMBER: 0408MS LATITUDE: 37 1.3 N HARBOR SQUARE: 116 CORE TYPE: DATE CORE TAKEN: 040801
SHIP NAME: LONGITUDE: 75 30.4 W WATER DEPTH: 23.0 M CORE LENGTH: 42.0 CM DATE ANALYZED: APR02

SAMPLING INTERVAL (CM) FROM: 0 10.0 20.0 30.0
TO: 10.0 20.0 30.0 42.0

NET UNIT WEIGHT (GRAMS/CCM):	1.99	2.01	1.99	2.01
SPECTIFIC GRAVITY OF SOLIDS:	2.67	2.67	2.67	2.67
WATER CONTENT (DRY WEIGHT):	25.8	24.4	25.7	24.7
VOID RATIO:	0.609	0.651	0.606	0.659
SATURATED VOID RATIO:	0.609	0.651	0.606	0.659
POROSITY:	0.407	0.395	0.409	0.397

REMARKS:

*CALCULATED, ASSUMING 100% SATURATION, FROM THE RELATIONSHIP:
NET UNIT WEIGHT = SP. GRV * (1 + (WMOISTURE / 100)) / (1 + (SP. GRV + (WMOISTURE / 100)))

Sediment Size and Composition Data

CRUISE BURNMS	TAKEN SAUG01	LATITUDE	37 1-30 N	HARBOR SQUARE	116	LENGTH	42.0	ANALYZED	APR02
SAMPLE C1-2	DEPTH 23.0	LONGITUDE	75 30.40 W	CORE TYPE		PENETRATION			
SUBSAMPLE ID	DEPTH INTERVAL	557 45	557 46	557 47	557 48				
		0-10.0	10.0-20.0	20.0-30.0	30.0-42.0				
DIA (PHI)	DIA (MM)	PERCENT	PERCENT	PERCENT	PERCENT				
<-4	>16.000	.000	.000	.000	.000				
-4 TO -3	16.000 TO 8.000	.000	.000	.000	.000				
-3 TO -2	8.000 TO 4.000	.000	.000	.000	.000				
-2 TO -1	4.000 TO 2.000	.047	.014	.019	.036				
-1 TO 0	2.000 TO 1.000	.070	.009	.038	.072				
0 TO 1	1.000 TO .500	.109	.050	.057	.072				
1 TO 2	.500 TO .250	.529	.373	.283	.145				
2 TO 3	.250 TO .125	0.400	21.730	33.420	39.624				
3 TO 4	.125 TO .063	83.375	72.146	59.347	50.208				
4 TO 5	.063 TO .031	2.506	1.912	1.905	2.045				
5 TO 6	.031 TO .016	.362	.240	.283	.308				
6 TO 7	.016 TO .008	.111	.070	.113	.145				
7 TO 8	.008 TO .004	.111	.117	.132	.163				
8 TO 9	.004 TO .002	.111	.099	.132	.163				
9 TO 10	.002 TO .001	.167	.117	.170	.181				
>10	<.001	3.954	3.474	4.094	7.837				
GRAVEL (4.75-16.0 MM)		.047	.014	.019	.036				
SAND (0.075-4.75 MM)		92.629	93.923	93.152	89.122				
SILT (0.004-0.075 MM)		3.001	2.990	2.434	2.661				
CLAY (<0.004 MM)		4.233	3.604	4.395	8.181				
MEAN (MM)		.0755	.0606	.0688	.0765				
MEAN (PHI)		3.726	3.563	3.493	3.709				
STANDARD DEVIATION		1.479	1.434	1.508	2.096				
SKEWNESS		1.982	1.998	1.792	1.324				
KURTOSIS		15.205	16.692	13.159	5.883				
COLOR (ASA)		N3/	N3/	N3/	N3/				

Core Number 10

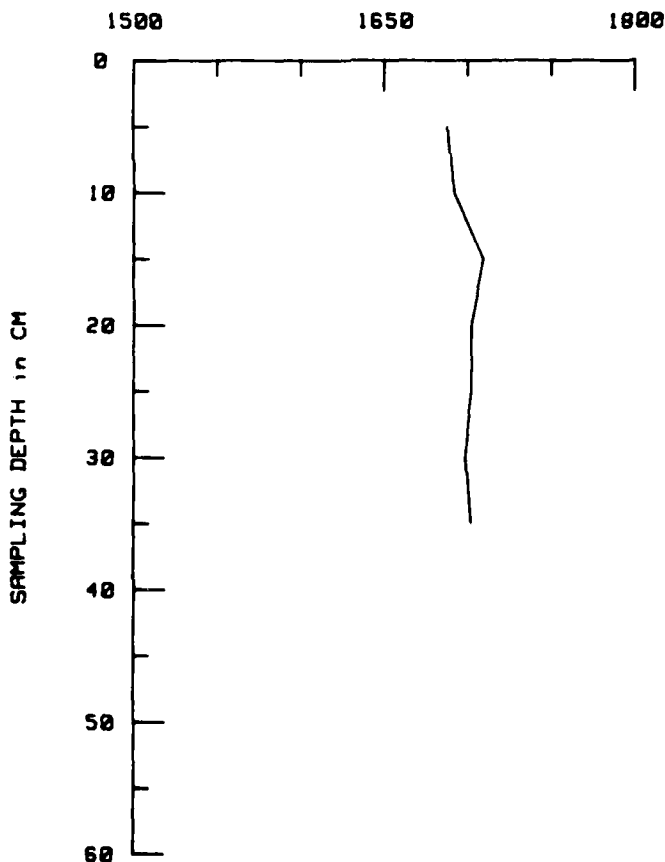
Compressional Wave Velocity

Lab Item: 557 Core: 10 (C1-2)

Cruise Number: BURMAS Latitude : 37 1.3 N Date Analyzed : 4 Aug 81
 Ship: CGC Maadrona Longitude: 75 38.4 W Date Completed : Aug 81
 Insitu Salinity: 30.75 ppt Insitu Temperature: 11.46C water Depth: 23.0M
 Sound Velocity of Bottom water: 1490 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1685	1692	1688
10.0	1692	1692	1692
15.0	1709	1709	1709
20.0	1702	1702	1702
25.0	1702	1702	1702
30.0	1695	1702	1698
35.0	1702	1702	1702

in M/SEC
at INSITU CONDITIONS



Core Number 10

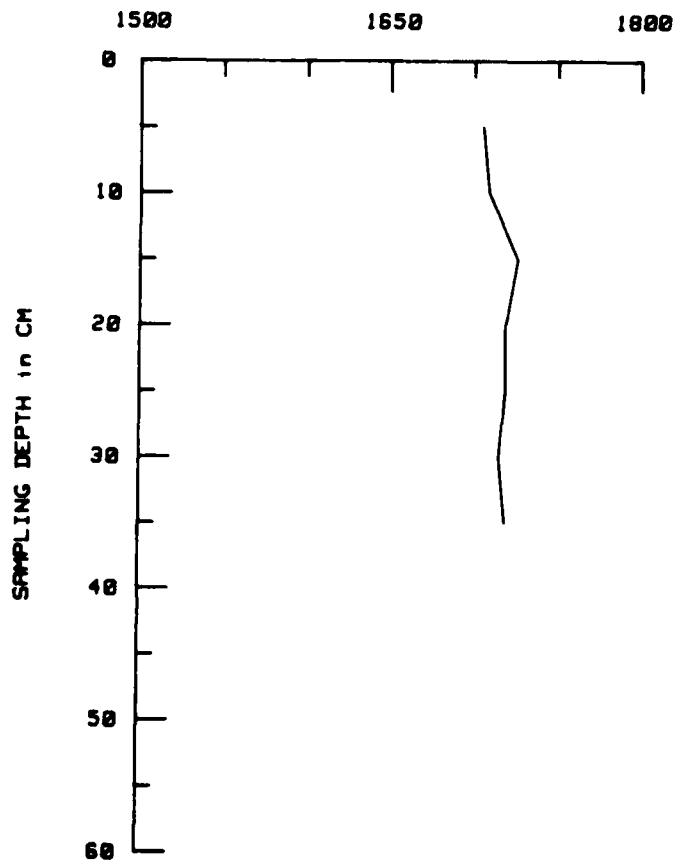
Compressional Wave Velocity, Continued

Lab Item: 557 Core: 10 (C1-2)

Cruise Number: BURMS Latitude : 37 1. 3 N Date Analyzed : 4 Aug 61
 Ship: CGC Madrona Longitude: 75 38. 4 W Date Completed : Aug 61
 Insitu Salinity: 32.11 ppt Insitu Temperature: 16.54C Water Depth: 23.0M
 Sound Velocity of Bottom Water: 1509 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1702	1709	1705
10.0	1709	1709	1709
15.0	1726	1726	1726
20.0	1719	1719	1719
25.0	1719	1719	1719
30.0	1712	1719	1715
35.0	1719	1719	1719

in M/SEC
at INSITU CONDITIONS



Core Number 10

Compressional Wave Velocity, Continued

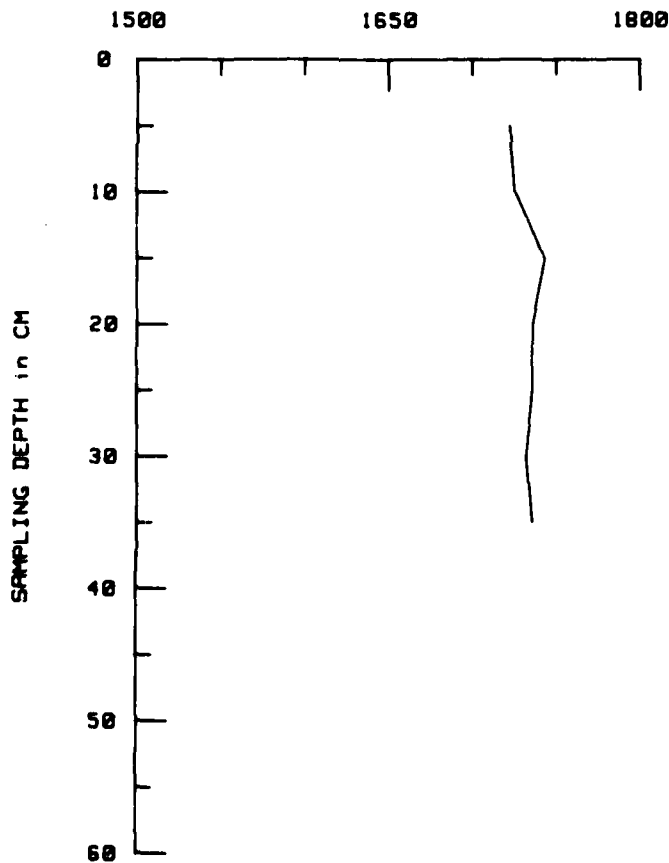
Lab Item: 557 Core: 10 (C1-2)

Cruise Number: BURNMS Latitude: 37 1.3 N Date Analyzed: 4 Aug 81
 Ship: CGC Madrona Longitude: 75 38.4 W Date Completed: Aug 81

Insitu Salinity: 33.59 ppt Insitu Temperature: 22.64C Water Depth: 23.0M
 Sound Velocity of Bottom Water: 1528 M/Sec

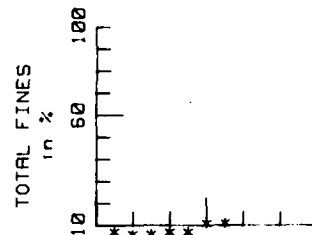
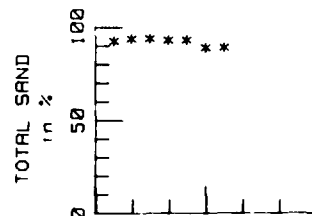
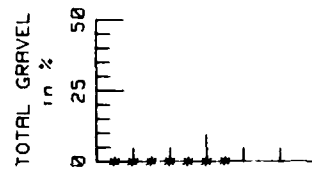
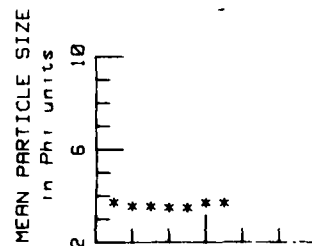
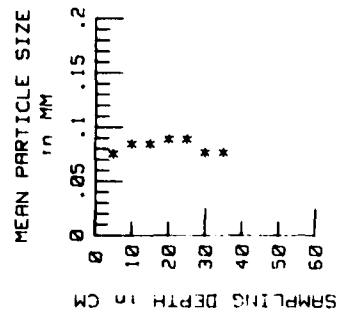
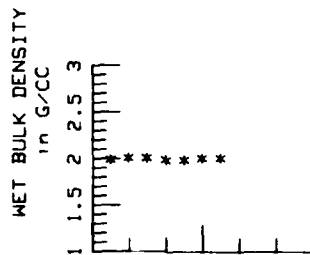
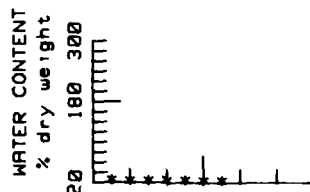
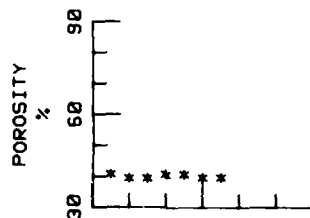
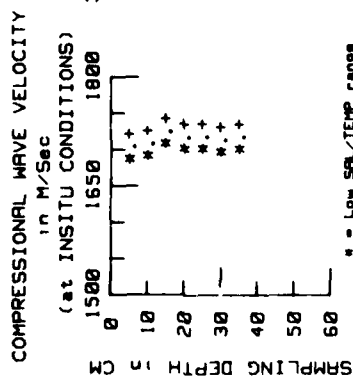
Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1719	1726	1722
10.0	1726	1726	1726
15.0	1743	1743	1743
20.0	1736	1736	1736
25.0	1736	1736	1736
30.0	1729	1736	1732
35.0	1736	1736	1736

in M/SEC
 at INSITU CONDITIONS



Core Number 10

SUMMARY of ACOUSTIC AND SEDIMENT MEASUREMENTS for Lab Item: 557 Core: 10 (C1-2)



Core Number 11

Core Visual Description Sheet

SAMPLE CORE 11
 LATITUDE 37°01.4'N
 CORE LENGTH 52 cm
 DATE TAKEN 4 AUG 81

LABORATORY REPORT 557
 WATER DEPTH 23 m
 CORE PENETRATION UNKNOWN
 ANALYST L. M. REYNOLDS
 DATE AUGUST 1981

VISUAL OBSERVATIONS		DEPTH (cm.)	CORE SKETCH	COLOR	LAB. NO.	SAMPLE INTERVAL (cm.)	SEDIMENT TYPE (Visual)
0-20 cm: Heavily mottled silty sand (N21). Gradational change in both color and texture and disappearance of mottling in next lower interval.		5		5Y4/1	557-49	0 - 10	Silty Sand
		10					
20-52 cm: Homogeneous sand to bottom.		15		5Y4/1	557-51	20 - 30	Sand
		20					
		25					
		30					
		35					
		40					
		45					
		50					

Core Number 11

Bottom Sediment Analysis Summary

Engineering and Mass Physical Properties

LAR ITEM NUMBER: 557 CORE NUMBER: C1-3

CRUISE NUMBER: PURHMS LATITUDE: 37 1.4 N MARSDEN SQUARE: 116 CORE TYPE: DATE CORE TAKEN: 4AUG81
SHIP NAME: LONGITUDE: 75 38.4 W WATER DEPTH: 23.0 M CORE LENGTH: 52.0 CM DATE ANALYZED: APR81

SAMPLING INTERVAL (CM) FROM: 0 10.0 20.0 30.0 40.0
TO: 10.0 20.0 30.0 40.0 52.0

WET UNIT WEIGHT (GRAMS/CCM): * 1.99 * 2.00 * 2.02 * 2.00 * 2.01
SPECIFIC GRAVITY OF SOLIDS: 2.67 2.67 2.67 2.67 2.67
WATER CONTENT (PERCENT WEIGHT): 26.0 24.8 23.8 25.1 24.3
VOID RATIO: * .694 * .682 * .635 * .670 * .649
SATURATED VOID RATIO: * .694 * .682 * .635 * .670 * .649
POROSITY (%): * 40.98 * 39.84 * 38.86 * 40.13 * 39.35

REMARKS:

* CALCULATED, ASSUMING 100% SATURATION, FROM THE RELATIONSHIP:
WET UNIT WEIGHT = SP. GRV * (1 + (WMOISTURE / 100)) / 1 + (SP. GRV * (WMOISTURE / 100))

Sediment Size and Composition Data

CRUISE SAMPLE	PURHMS C1-3	TAKEN DEPTH	DATE 23.0	LATITUDE 37 1.4 N	LONGITUDE 75 38.4 W	MARSDEN SQUARE 116	CORE TYPE	LENGTH 52.0	ANALYZED APR82
		SURSAMPLE ID DEPTH INTERVAL	557 49 0-10.0	557 50 10.0-20.0	557 51 20.0-30.0	557 52 30.0-40.0	557 53 40.0-52.0		
		DIAM (PHI)	DIAM (MM)	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	
		< .4	> 16.000	.000	.000	.000	.000	.000	
		-4 TO -3	16.000 TO 8.000	.000	.000	.000	.000	.000	
		-3 TO -2	8.000 TO 4.000	.000	.000	.000	.000	.000	
		-2 TO -1	4.000 TO 2.000	.000	.073	.000	.000	.000	
		-1 TO 0	2.000 TO 1.000	.098	.110	.012	.012	.012	
		0 TO 1	1.000 TO .500	.119	.201	.047	.019	.019	
		1 TO 2	.500 TO .250	.357	.513	.164	.091	.193	
		2 TO 3	.250 TO .125	18.530	34.588	82.137	34.771	21.606	
		3 TO 4	.125 TO .063	70.005	52.988	59.600	58.328	64.102	
		4 TO 5	.063 TO .031	2.783	2.343	2.291	2.037	4.078	
		5 TO 6	.031 TO .016	.642	.934	.304	.274	.483	
		6 TO 7	.016 TO .008	.333	.604	.140	.120	.116	
		7 TO 8	.008 TO .004	.452	.494	.210	.137	.777	
		8 TO 9	.004 TO .002	.309	.494	.117	.086	.001	
		9 TO 10	.002 TO .001	.262	.458	.164	.137	.135	
		> 10	< .001	6.161	6.207	4.815	3.989	9.121	
		GRAVEL (2.0-6.3 MM)		.000	.073	.000	.000	.000	
		SAND (0.075-2.0 MM)		89.058	88.393	91.960	93.220	85.931	
		SILT (0.004-0.075 MM)		9.210	9.376	2.995	2.960	4.750	
		CLAY (< 0.004 MM)		6.732	7.159	5.095	4.212	9.315	
		MEAN (MM)		.0702	.0771	.0893	.0899	.0631	
		MEAN (PHI)		3.833	3.696	3.568	3.476	3.986	
		STANDARD DEVIATION		1.858	1.976	1.691	1.563	2.146	
		SKEWNESS		1.463	1.332	1.686	1.840	1.251	
		KURTOSIS		7.729	6.956	81.090	13.803	4.677	
		COLOR (GSA)		5/4/1	5/4/1	5/4/1	5/4/1	5/4/1	

Core Number 11

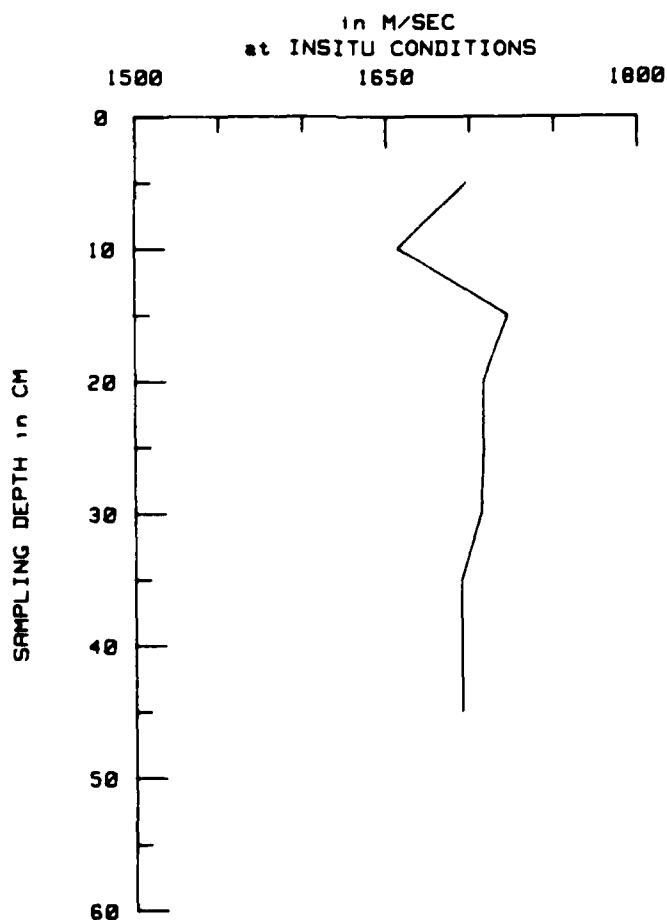
Compressional Wave Velocity

Lab Item: 557 Core: 11 (C1-3)

Cruise Number: BURNMS Latitude : 37 1.4 N Date Analyzed : 4 Aug 81
Ship: CGC Madrona Longitude: 75 38.4 W Date Completed : Aug 81

Insitu Salinity: 30.75 ppt Insitu Temperature: 11.46C Water Depth: 23.0M
Sound Velocity of Bottom Water: 1490 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1698	1698	1698
10.0	1657	1657	1657
15.0	1723	1723	1723
20.0	1708	1708	1708
25.0	1708	1708	1708
30.0	1708	1705	1706
35.0	1695	1695	1695
40.0	1695	1695	1695
45.0	1695	1695	1695



Core Number 11

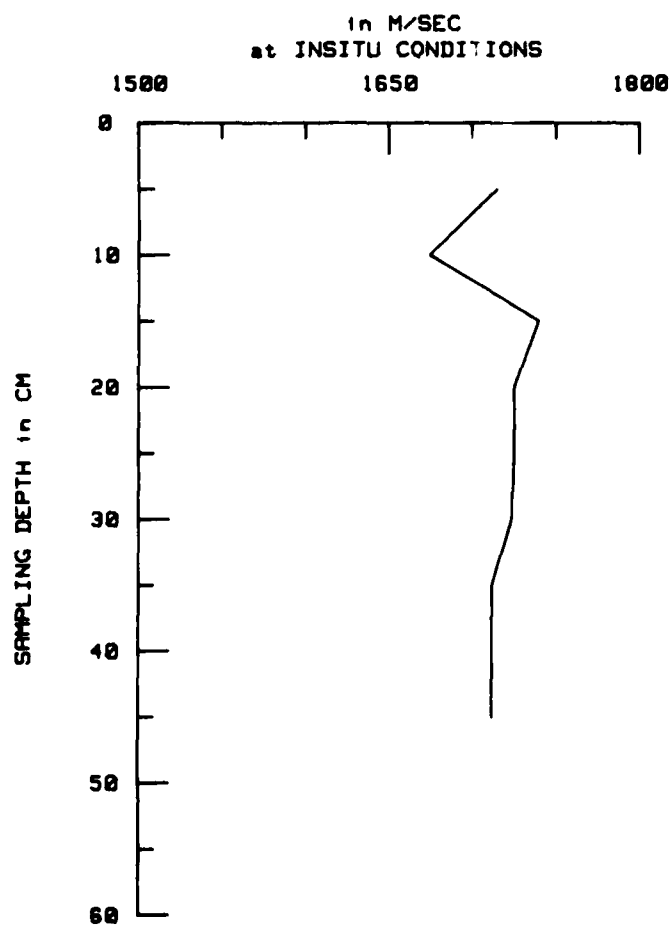
Compressional Wave Velocity, Continued

Lab Item: 557 Core: 11(C1-3)

Cruise Number: BURMMS Latitude : 37 1.4 N Date Analyzed : 4 Aug 81
Ship: CGC Madrona Longitude: 75 38.4 W Date Completed : Aug 81

Insitu Salinity: 32.11 ppt Insitu Temperature: 16.54C Water Depth: 23.0M
Sound Velocity of Bottom Water: 1509 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1715	1715	1715
10.0	1674	1674	1674
15.0	1740	1740	1740
20.0	1725	1725	1725
25.0	1725	1725	1725
30.0	1725	1722	1723
35.0	1712	1712	1712
40.0	1712	1712	1712
45.0	1712	1712	1712



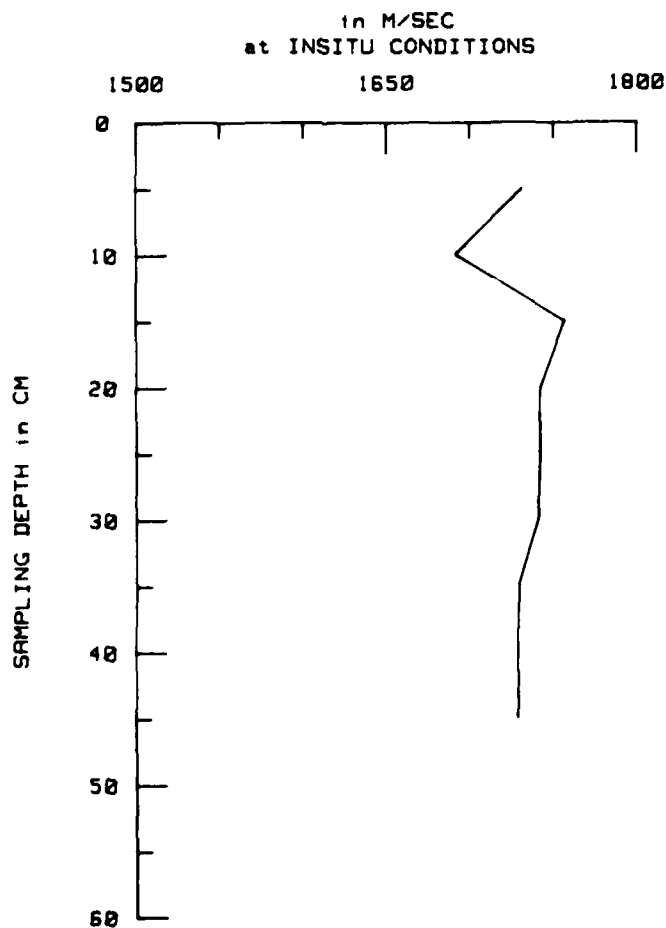
Core Number 11

Compressional Wave Velocity, Continued

Lab Item: 557 Core: 11 (C1-3)

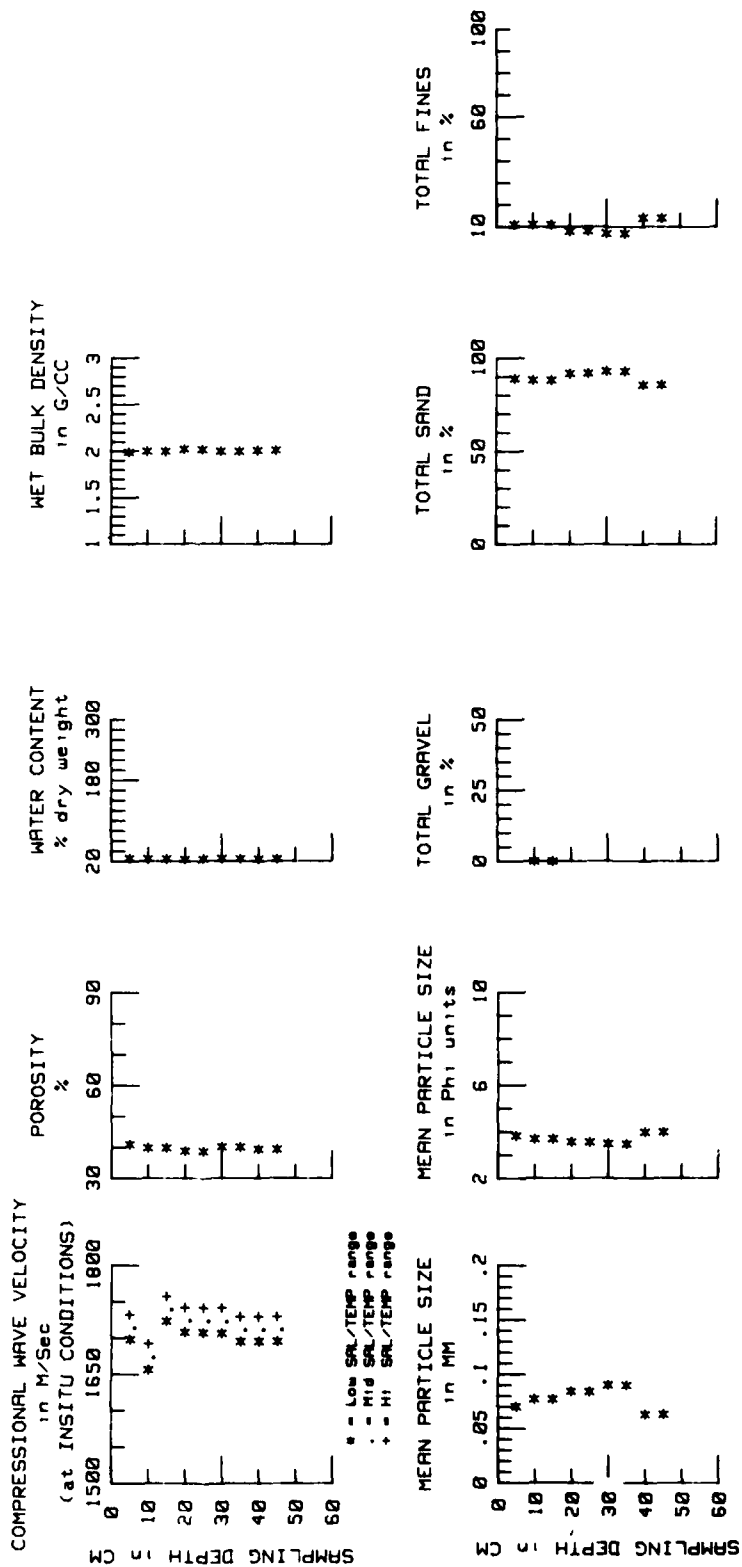
Cruise Number: BURAMS Latitude : 37 1.4 N Date Analyzed : 4 Aug 61
 Snip: CGC Madrona Longitude: 75 38.4 W Date Completed : Aug 61
 Insitu Salinity: 33.59 ppt Insitu Temperature: 22.64C Water Depth: 23.0M
 Sound Velocity of Bottom Water: 1528 M/Sec

Core DEPTH (M)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1732	1732	1732
10.0	1692	1692	1692
15.0	1757	1757	1757
20.0	1742	1742	1742
25.0	1742	1742	1742
30.0	1742	1739	1741
35.0	1729	1729	1729
40.0	1729	1729	1729
45.0	1729	1729	1729



Core Number 11

SUMMARY of ACOUSTIC AND SEDIMENT MEASUREMENTS for Lab Item: 557 Core: 11 (C1-3)



Core Number 12

Core Visual Description Sheet

SAMPLE: CORE 12
 LATITUDE: 36°59.3'N
 CORE LENGTH: 48.5 cm
 DATE TAKEN: 5 AUG 81
 ANALYST: L. M. REYNOLDS
 LONGITUDE: 76°10.8'W
 CORE PENETRATION: UNKNOWN
 LABORATORY REPORT: 557
 WATER DEPTH: 10 m
 SAMPLER TYPE: DIVER (2 1/2")
 DATE: AUGUST 1981

VISUAL OBSERVATIONS	DEPTH (cm.)	CORE SKETCH	COLOR	LAB. NO.	SAMPLE INTERVAL (cm.)	SEDIMENT TYPE (Visual)
0-9 cm: Moderately mottled (M ₄). Strong fishy odor. Very soft. Gradational change in color and texture.	5		SG3/1	557-54	0 - 9	Clayey Silt
9-17 cm: Homogenous. Gradational change in color and texture.	10			557-55	9 - 17	Silty Clay
17-26 cm: Soft at top of interval, stiffening downward. Large shell (3 cm) prevented shear strength measurement. Distinct change due to appearance of cracks in the core.	15			557-56	17 - 26	Silty Sand
26-33 cm: Soft material with many cracks (disturbance) throughout the interval. Gradational change due to disappearance of the cracks.	20		SG3/1	557-57	26 - 33	
33-40 cm: Same material as in above interval but it is not disturbed. Gradational change in texture.	25			557-58	33 - 40	
40-48.5 cm: Homogenous to bottom.	30			557-59	40 - 48.5	Sand Silty Clay
	35					
	40					
	45					
	48.5 cm					

Core Number 12

Bottom Sediment Analysis Summary

Engineering and Mass Physical Properties

LAB ITEM NUMBER: 557 CORE NUMBER: H1

CRUISE NUMBER: PUEHMS LATITUDE: 36 59.3 N MARSDEN SQUARE: 116 CORE TYPE: DATE CORE TAKEN: SAUG81
SHIP NAME: LONGITUDE: 76 10.8 W WATER DEPTH: 17.0 M CORE LENGTH: 48.5 CM DATE ANALYZED: APR81

SAMPLING INTERVAL (CM) FROM: 0.0 9.0 17.0 26.0 33.0 40.0
TO: 9.0 17.0 26.0 33.0 40.0 48.5

NET UNIT WEIGHT (GFMS/CCM): 1.71 1.79 1.88 1.83 1.94 1.87
SPECIFIC GRAVITY OF SOLIDS: 2.67 2.67 2.67 2.67 2.67 2.67
WATER CONTENT (DRY WEIGHT): 50.4 42.1 33.7 38.2 29.0 30.3
VOID RATIO: 1.346 1.124 .900 1.020 .774 .916
SATURATED VOID RATIO: 1.346 1.124 .900 1.020 .774 .916
POROSITY (%): 57.37 52.92 47.36 50.49 43.64 47.80
COHESION

NATURAL (CM/SC CM): 28.5
REMOLD (CM/SC CM): 5.9

SENSITIVITY: 4.80

REMARKS:

*CALCULATED, ASSUMING 100% SATURATION, FROM THE RELATIONSHIP:
NET UNIT WEIGHT = SP. GRV * (1 + (WATER / 100)) / 1 + (SP. GRV + (WATER / 100))

Sediment Size and Composition Data

CRUISE PUEHMS SAMPLE #1	TAKEN DEPTH 10.0	SAUG81 10.0	LATITUDE 36 59.30 N LONGITUDE 76 10.80 W	MARSDEN SQUARE 116 CORE TYPE	LENGTH PENETRATION 48.5	ANALYZED APR81
SUBSAMPLE ID: DEPTH INTERVAL	557 54 0.0-9.0	557 55 9.0-17.0	557 56 17.0-26.0	557 57 26.0-33.0	557 58 33.0-40.0	557 59 40.0-48.5
DIAM (MM)	DIAM (MM)	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
<4	>16.000	.000	.000	.000	.000	.000
4 TO 6	16.000 TO 8.000	.000	.000	.000	.000	.000
6 TO 8	8.000 TO 4.000	.000	.107	.195	.000	.000
8 TO 10	4.000 TO 2.000	.034	.000	.113	.000	.000
10 TO 12	2.000 TO 1.000	.019	.081	.081	.012	.021
12 TO 14	1.000 TO .500	.070	.124	.157	.023	.033
14 TO 16	.500 TO .250	.176	.122	.157	.115	.133
16 TO 18	.250 TO .125	.288	.244	.200	.174	.171
18 TO 20	.125 TO .063	.45.441	.44.682	.43.287	.51.180	.62.255
20 TO 22	.063 TO .031	13.339	11.354	12.384	11.340	12.082
22 TO 24	.031 TO .016	5.593	6.431	4.390	3.864	3.104
24 TO 26	.016 TO .008	2.545	3.273	2.733	2.001	1.834
26 TO 28	.008 TO .004	2.629	3.654	2.180	1.587	1.813
28 TO 30	.004 TO .002	1.538	2.387	1.832	1.210	1.212
30 TO 32	.002 TO .001	1.594	2.183	1.832	.966	1.419
32 TO 34	.001 TO .000	23.965	20.241	28.054	18.999	14.332
34 TO 36	.000 TO .000					15.950
GRAVEL (2.0-6.3 MM)		.034	.107	.308	.000	.000
SAND (0.075-2.0 MM)		48.765	49.658	46.288	60.023	64.196
SILT (.004-.075 MM)		24.104	25.614	21.687	18.792	18.833
CLAY (<.004 MM)		27.097	24.221	31.717	21.185	16.971
MEAN (MM)		.0184	.0205	.0154	.0273	.0326
MEAN (MM)		5.736	5.605	5.988	5.193	4.838
STANDARD DEVIATION		2.942	2.880	3.121	2.806	2.550
SKEWNESS		.392	.388	.268	.584	.745
KURTOSIS		-1.176	-.902	-1.322	-.349	.548
COLOR (GSA)		5G3/1	5G3/1	5G3/1	5G3/1	5G3/1

Core Number 12

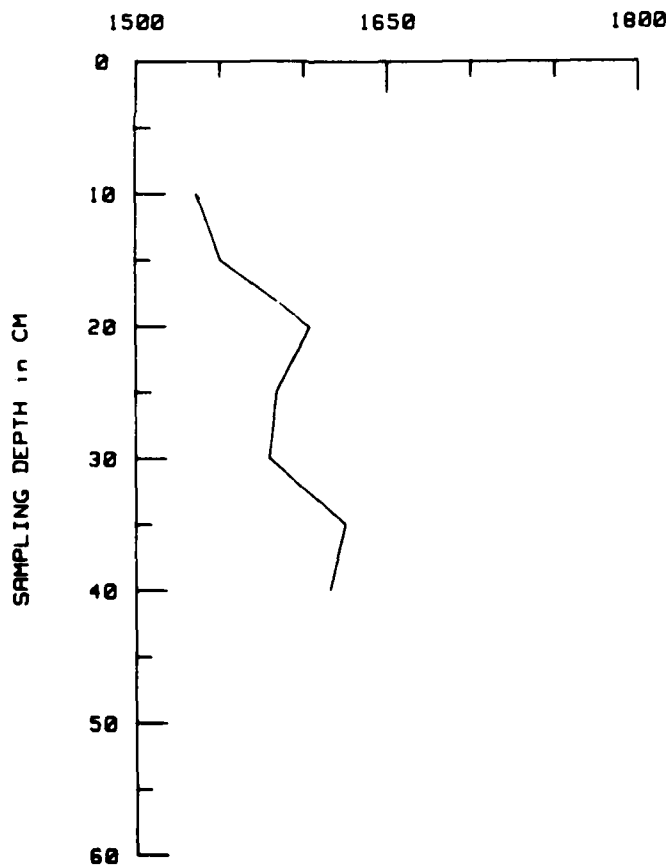
Compressional Wave Velocity

Lab Item: 557 Core: 12 (H1)

Cruise Number: BURMMS Latitude : 36 59.3 N Date Analyzed : 4 Aug 61
 Ship: CGC Madrona Longitude: 76 10.8 W Date Completed : Aug 61
 Insitu Salinity: 24.63 ppt Insitu Temperature: 14.55C Water Depth: 10.0M
 Sound Velocity of Bottom Water: 1493 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
10.0	1537	1537	1537
15.0	1551	1551	1551
20.0	1604	1604	1604
25.0	1589	1580	1584
30.0	1580	1580	1580
35.0	1625	1625	1625
40.0	1616	1616	1616

in M/SEC
at INSITU CONDITIONS



Core Number 12

Compressional Wave Velocity, Continued

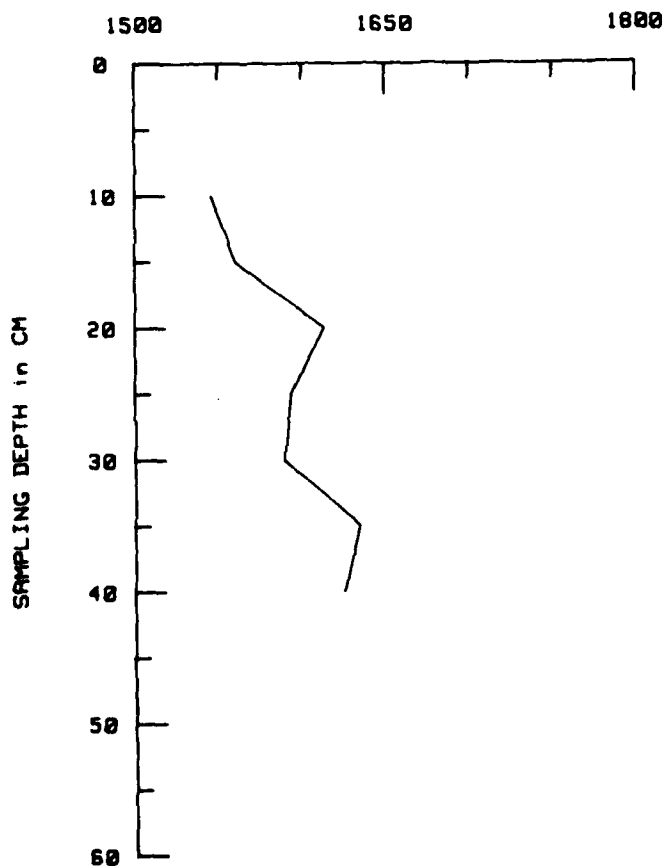
Lab Item: 557 Core: 12 (H1)

Cruise Number: BURNMS Latitude: 36 59.3 N Date Analyzed: 4 Aug 81
Ship: CGC Madrona Longitude: 76 10.8 W Date Completed: Aug 81

Insitu Salinity: 28.84 ppt Insitu Temperature: 17.31C Water Depth: 10.0M
Sound Velocity of Bottom Water: 1507 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
10.0	1546	1546	1546
15.0	1560	1560	1560
20.0	1613	1613	1613
25.0	1598	1589	1593
30.0	1589	1589	1589
35.0	1634	1634	1634
40.0	1625	1625	1625

in M/SEC
at INSITU CONDITIONS



Core Number 12

Compressional Wave Velocity, Continued

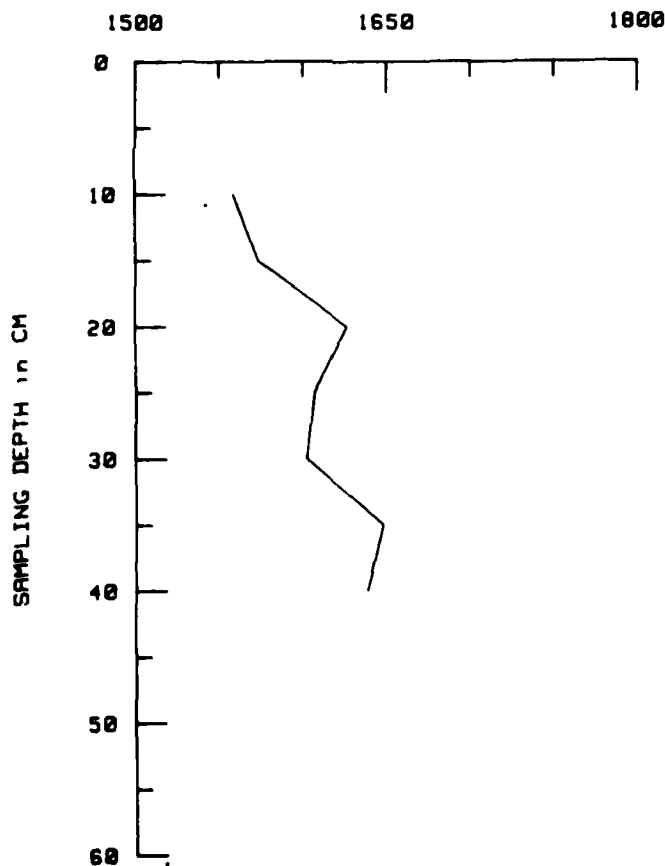
Lab Item: 557 Core: 12 (M1)

Cruise Number: BURMMS Latitude: 36 59.3 N Date Analyzed: 4 Aug 81
Ship: CGC Madrona Longitude: 76 10.8 W Date Completed: Aug 81

In situ Salinity: 31.84 ppt In situ Temperature: 21.83C Water Depth: 10.0M
Sound Velocity of Bottom Water: 1523 M/Sec

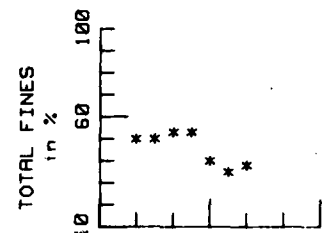
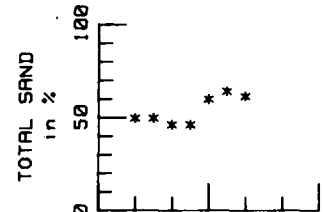
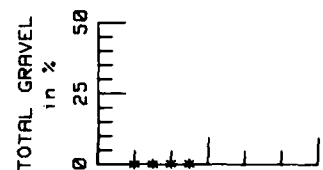
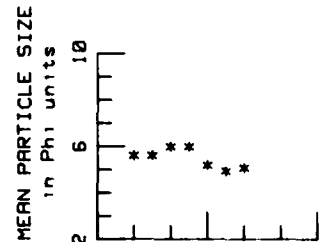
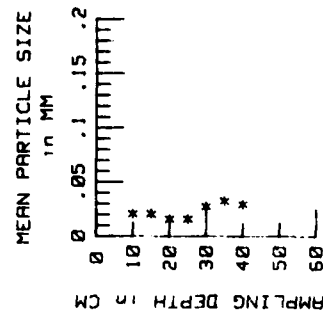
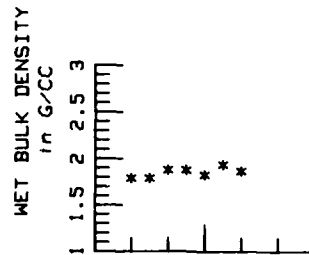
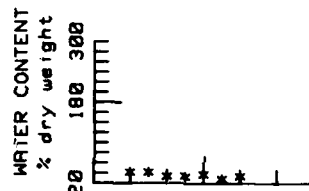
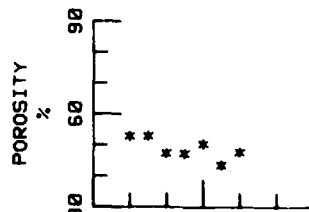
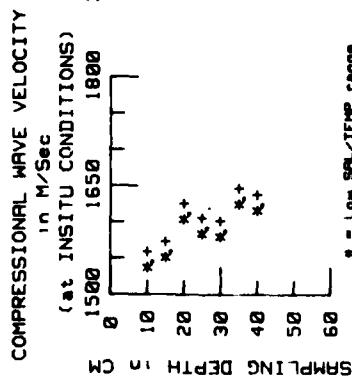
Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
10.0	1559	1559	1559
15.0	1573	1573	1573
20.0	1626	1626	1626
25.0	1611	1602	1606
30.0	1602	1602	1602
35.0	1647	1647	1647
40.0	1638	1638	1638

in M/SEC
at INSITU CONDITIONS



Core Number 12

SUMMARY of ACOUSTIC AND SEDIMENT MEASUREMENTS for Lab Item: 557 Core: 12 (H1)



Core Number 13

Core Visual Description Sheet

SAMPLE: CORE 13
 LATITUDE: 36°58.3'N
 CORE LENGTH: 55 cm
 DATE TAKEN: 6 AUG 81

LONGITUDE: 76°02.3'W
 WATER DEPTH: 10 m
 CORE PENETRATION: UNKNOWN
 ANALYST: L. H. REYNOLDS

LABORATORY REPORT: 557
 SAMPLER TYPE: DIVER (2 1/2")
 DATE: AUGUST 1981

VISUAL OBSERVATIONS	DEPTH (cm.)	CORE SKETCH	COLOR	LAB. NO.	SAMPLE INTERVAL (cm.)	SEDIMENT TYPE (Visual)
0-13/17 cm: Homogenous. Firm, well-packed sand. Distinct change due to color.	5		5G3/1	557-60	0 - 10	Silty Sand
	10			557-61	10 - 13/17	
	15			557-62	13/17 - 20	
13/17-20 cm: Homogenous. Small amount of shell fragments throughout interval. Gradational change due to appearance of mottling.	20			557-63	20 - 30	
	25					
	30			557-64	30 - 40	
	35					
20-48 cm: Lightly mottled (5G3/1). Small amount of shell fragments, increasing downward with depth to a moderate amount between 38 and 41 cm. Gradational change due to increase in mottling.	40			557-65	40 - 48	
	45					
	50			557-66	48 - 55	
48-55 cm: Heavily mottled (5G3/1). Mottled material is horizontally oriented in lenses that vary in thickness from .2 to .5 cm with very indistinct edges. Very small amount of shell fragments.	55					

Core Number 13

Bottom Sediment Analysis Summary

Engineering and Mass Physical Properties

LAR ITEM NUMBER: 557 CORE NUMBER: 51

CRUISE NUMBER: RUFHMS LATITUDE: 36 58.5 N MARSDEN SQUARE: 116 CORE TYPE: DATE CORE TAKEN: SAUG81
SHIP NAME: LONGITUDE: 76 2.3 W WATER DEPTH: 15.0 M CORE LENGTH: 55.0 CM DATE ANALYZED: APR82

AMPLING INTERVAL (CM) FROM: 0 20.0 30.0 40.0
TO: 10.0 30.0 40.0 48.0

BT UNIT WEIGHT (GRAMS/CCM): * 2.02 * 1.94 * 1.97 * 1.98
SPECIFIC GRAVITY OF SOLIDS: 2.67 2.67 2.67 2.67
WATER CONTENT (DRY WEIGHT): 24.0 28.8 26.9 26.1
VOID RATIO: * .641 * .769 * .718 * .697
SATURATED VOID RATIO: * .641 * .769 * .718 * .697
POROSITY (%): * 39.05 * 43.47 * 41.80 * 41.07

REMARKS:

* CALCULATED, ASSUMING 100% SATURATION, FROM THE RELATIONSHIP:
WET UNIT WEIGHT = SP. GRV * (1 + (WATER / 100)) / 1 + (SP. GRV + (WATER / 100))

Sediment Size and Composition Data

CRUISE FURHMS SAMPLE S1	TAKEN SAUG81 DEPTH 15.0	LATITUDE LONGITUDE	36 58.50 N 76 2.30 W	MARSDEN SQUARE 116 CORE TYPE	LENGTH PENETRATION	55.0	ANALYZED	APR81
	SUP SAMPLE ID DEPTH INTERVAL	557 60 0-10.0	557 61 10.0-17.3	557 62 17.0-20.0	557 63 20.0-30.0	557 64 30.0-40.0	557 65 40.0-48.0	557 66 48.0-55.0
DIAM (PHI)	DIAM (MM)	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
<-4	>16.000	.000	.000	.000	.000	.000	.000	.000
-4 TO -3	16.000 TO 8.000	.000	.000	.000	.000	.000	.000	.000
-3 TO -2	8.000 TO 4.000	.000	.000	.000	.000	.000	.000	.000
-2 TO -1	4.000 TO 2.000	.021	.013	.083	.000	.000	.046	.000
-1 TO 0	2.000 TO 1.000	.005	.009	.128	.130	.005	.007	.070
0 TO 1	1.000 TO .500	.044	.056	.180	.151	.031	.161	.116
1 TO 2	.500 TO .250	.224	.243	.498	.606	.385	.738	.581
2 TO 3	.250 TO .125	83.574	44.493	46.688	47.101	49.585	51.264	36.252
3 TO 4	.125 TO .063	47.708	41.469	41.830	42.428	41.337	39.393	50.046
4 TO 5	.063 TO .031	8.424	1.496	1.612	1.363	6.084	1.083	2.067
5 TO 6	.031 TO .016	.000	.337	.379	.411	.000	.254	.650
6 TO 7	.016 TO .008	.000	.099	.166	.411	.000	.115	.418
7 TO 8	.008 TO .004	.000	.112	.190	.108	.000	.138	.511
8 TO 9	.004 TO .002	.000	.168	.166	.281	2.573	.115	.395
9 TO 10	.002 TO .001	.000	.131	.190	.195	.000	.161	.348
>10	<.001	.000	6.378	7.892	6.815	.000	6.523	8.546
GRAVEL (2.0 MM)		.021	.013	.083	.000	.000	.046	.000
SAND (2.0-.063 MM)		91.556	91.270	89.323	90.415	91.343	91.564	87.065
SILT (.063-.004 MM)		8.424	7.039	2.346	2.293	6.084	1.590	3.646
CLAY (<.004 MM)		.000	6.678	8.247	7.291	2.573	6.800	9.289
MEAN (MM)		.1133	.0890	.0815	.0855	.1100	.0907	.0706
MEAN (PHI)		3.181	3.489	3.617	3.548	3.185	3.462	3.825
STANDARD DEVIATION		.641	1.945	2.141	2.023	1.058	1.976	2.209
SKEWNESS		.146	1.500	1.302	1.398	1.616	1.476	1.197
KURTOSIS		.040	8.033	5.704	6.861	13.664	7.784	4.477
COLOR (BSA)		5GY4/1	N3/	N3/	N3/	N3/	N3/	N3/

Core Number 13

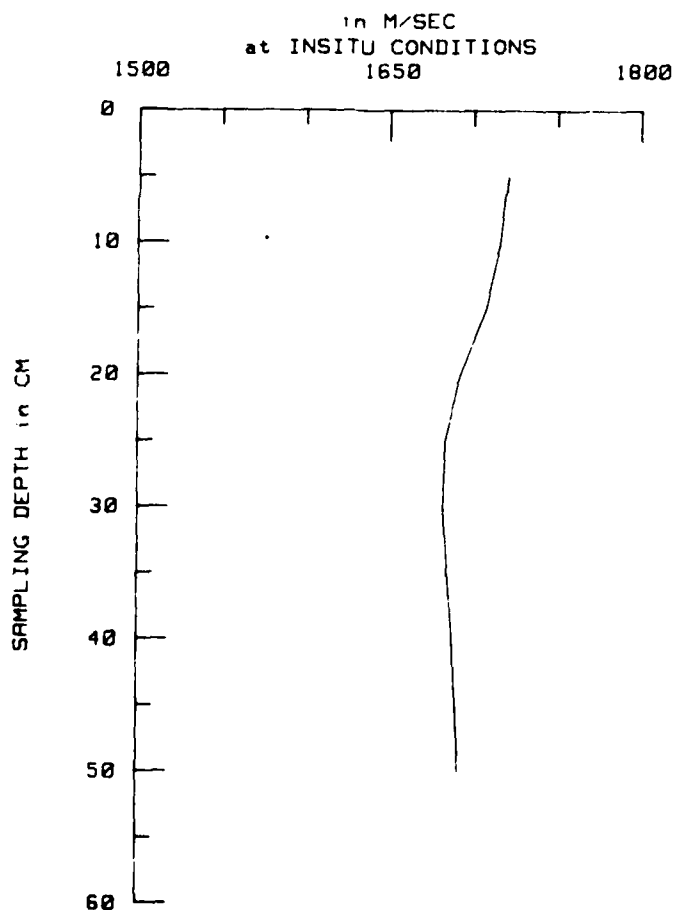
Compressional Wave Velocity

Lab Item: 557 Core: 13 (S1)

Cruise Number: BURMMS Latitude : 36 58.5 N Date Analyzed : 5 Aug 81
Ship: CGC Macrora Longitude: 76 2.3 W Date Completed : Aug 81

Insitu Salinity: 30.75 ppt Insitu Temperature: 11.46C Water Depth: 23.0M
Sound Velocity of Bottom Water: 1490 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1720	1720	1720
10.0	1716	1716	1716
15.0	1706	1710	1708
20.0	1679	1706	1692
25.0	1685	1682	1684
30.0	1672	1692	1682
35.0	1682	1688	1685
40.0	1688	1688	1688
45.0	1688	1692	1690
50.0	1692	1692	1692



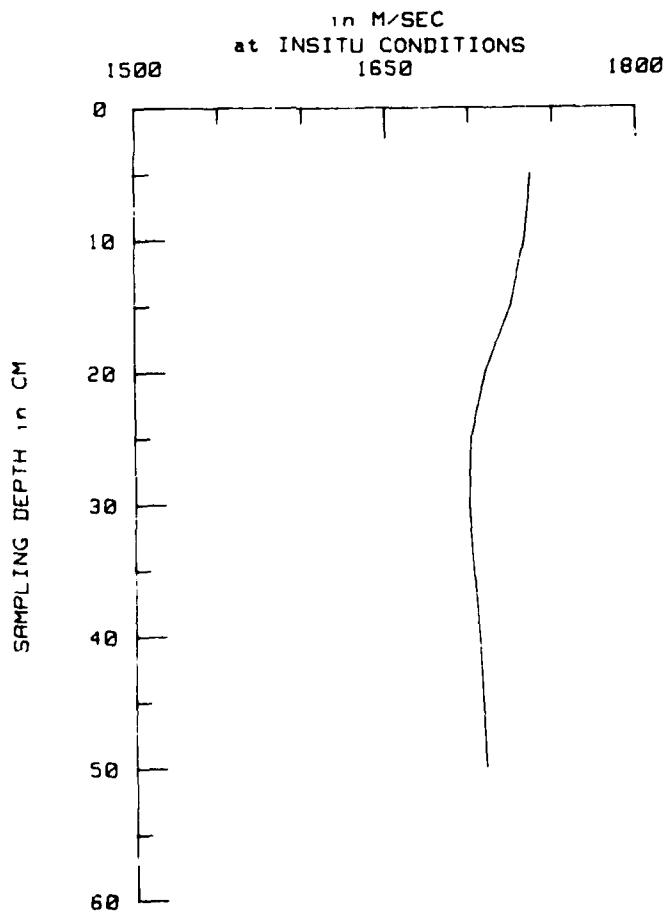
Core Number 13

Compressional Wave Velocity, Continued

Lab Item: 557 Core: 13 (S1)

Cruise Number: BURMMS Latitude : 36 58.5 N Date Analyzed : 5 Aug 81
 Ship: CGC Madrona Longitude: 76 2.3 W Date Completed : Aug 81
 Insitu Salinity: 32.11 ppt Insitu Temperature: 16.54C Water Depth: 23.0M
 Sound Velocity of Bottom Water: 1509 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1737	1737	1737
10.0	1733	1733	1733
15.0	1723	1727	1725
20.0	1696	1723	1709
25.0	1702	1699	1701
30.0	1689	1709	1699
35.0	1699	1705	1702
40.0	1705	1705	1705
45.0	1705	1709	1707
50.0	1709	1709	1709



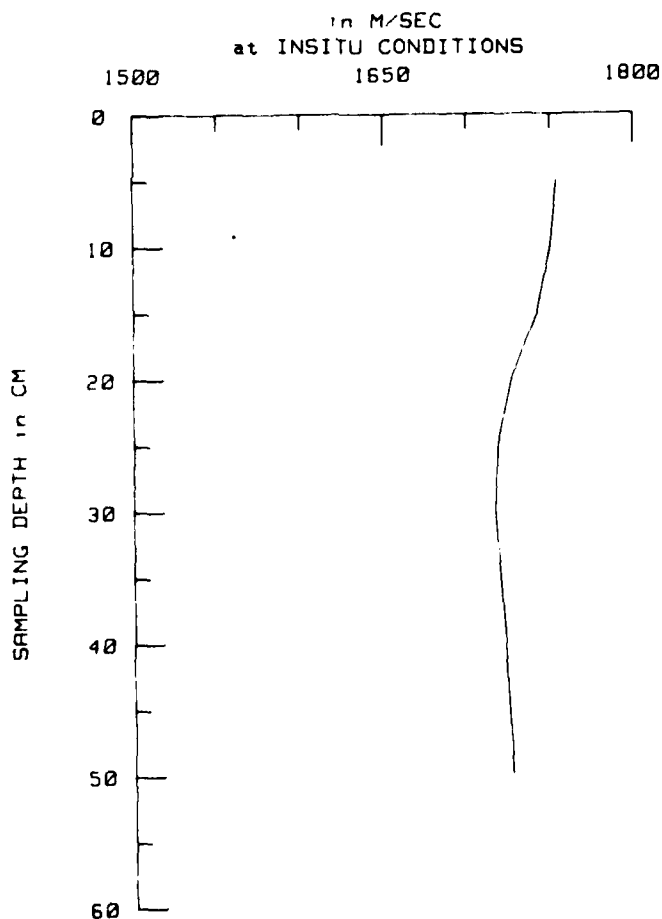
Core Number 13

Compressional Wave Velocity, Continued

Lab Item: 557 Core: 13 (S1)

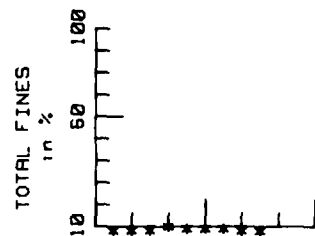
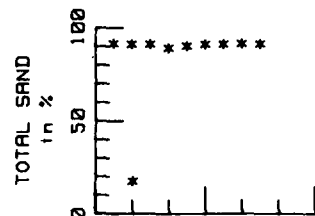
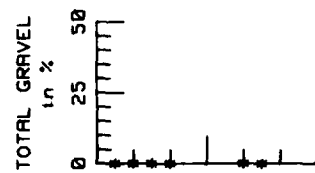
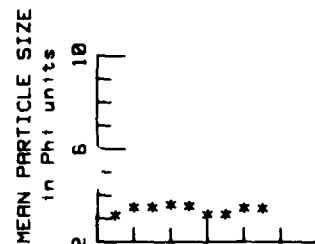
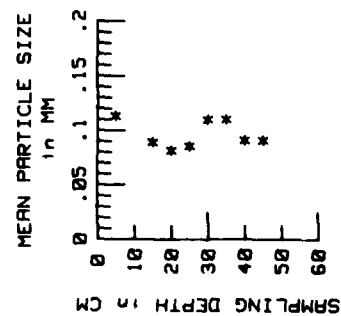
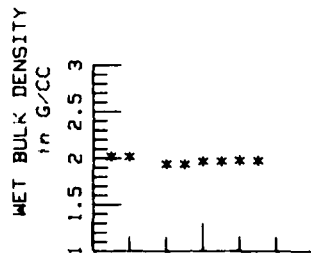
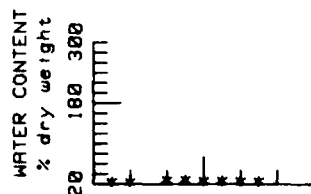
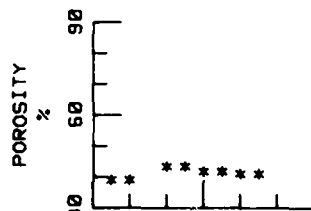
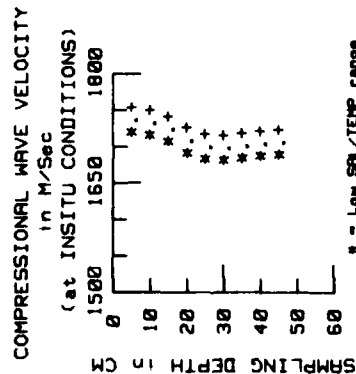
Cruise Number: WJRMMS Latitude : 36 58.5 N Date Analyzed : 5 Aug 81
 Ship: CGC Madrona Longitude: 76 2.3 W Date Completed : Aug 81
 Insitu Salinity: 33.59 ppt Insitu Temperature: 22.64C Water Depth: 23.0M
 Sound Velocity of Bottom water: 1526 M/Sec

Core DEPTH (CM)	SOUND VELOCITY - M/Sec		AVERAGE SOUND VELOCITY (M/Sec)
	Zero Degree Plane	90 Degree plane	
5.0	1754	1754	1754
10.0	1750	1750	1750
15.0	1740	1744	1742
20.0	1713	1740	1727
25.0	1719	1716	1718
30.0	1706	1726	1716
35.0	1716	1722	1719
40.0	1722	1722	1722
45.0	1722	1726	1724
50.0	1726	1726	1726



Core Number 13

SUMMARY of ACOUSTIC AND SEDIMENT MEASUREMENTS for Lab Item: 557 Core: 13 (S2)



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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER NORDA Technical Note 152	2. GOVT ACCESSION NO. AD-A118 166	3. RECIPIENT'S CATALOG NUMBER
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7. AUTHOR(s) L.M. Reynolds J. Bowman C. Ingram		6. PERFORMING ORG. REPORT NUMBER
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11. CONTROLLING OFFICE NAME AND ADDRESS Naval Ocean Research and Development Activity NSTL Station, Mississippi, 39529		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
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17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Tactical ASW Environmental Acoustic Support (TAEAS) mine countermeasures (MCM) mine burial prediction burial mines BURMMS		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Thirteen sea bottom cores were collected by scuba divers in the shallow water approaches to Norfolk, Virginia, and were analyzed for geotechnical, geoacoustical and sedimentological properties. These cores were collected in support of the Naval Ocean Research and Development Activity's Mine Attitude and Verification Task, sponsored by NAVAIR-548 and tasked by the Naval Coastal Systems Center (NCSC Code 722). Similar field efforts have been conducted in the San Diego, California, and Galveston, Texas, areas, and the analyses on the resulting bottom cores are underway. The results of these core analyses will be used with		

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historical data in the Naval Oceanographic Office's world-wide data bank to investigate the possible existence of reliable geotechnical property relationships for the East, West, and Gulf Coasts of the United States.

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